

Summary of Research on Modern Energy Cooking Services in Tanzania



Summary compiled by Dr Anna Clements, Gamos Ltd

30th October 2019

This material has been produced by TaTEDO, Loughborough University, University of Surrey & Gamos Ltd., supported by Innovate UK, UK Aid (DfID) & Gamos Ltd.

Innovate Project 132724



This material is licensed under creative commons attribution 4.0 license. 2019.

To cite, please refer to the original report(s). A list of references is at the end of this slide deck.

Implemented by:



Funded by:



With additional analysis by:



Aims of this slide deck

- To summarize the key findings of the reports related to research on Modern Energy Cooking Services (MECS) in Tanzania.
- To signpost the reader to the report that contains the information they are seeking.

This slide deck picks out only the headlines of the reports – there is a lot of important detail and depth that is omitted for the sake of brevity. This can be found in the reports on the MECS website:

<https://www.mecs.org.uk/working-papers/>



Innovate UK



The key takeaway:

- When research began, we thought eCook would include a solar PV panel, a battery, and a hotplate:



- But the research has shown that the Electric Pressure Cooker (EPC) is much more efficient for given meals than a hotplate, leads to a smaller battery, and can be on- or off-grid:



- We also realised that the efficiency of EPCs could be attractive for use with grid electricity to make electric cooking affordable. Furthermore, the combination with a battery potentially solved many of the problems of 'weak grids'.

So when you consider an eCook, there are now 3 scenarios:



How did we get there...



Tanzania Outputs: 8 reports



- Opportunities & Challenges for eCook Tanzania
- National Stakeholders Workshop report
- eCook and Gender in Tanzania
- eCook Tanzania Cooking Diaries
- eCook Tanzania Prototyping
- eCook Tanzania Focus Group Discussions Summary Report
- Policy and National Markets Review for eCook in Tanzania
- eCook Tanzania Discrete Choice Modelling

Overview Report: Opportunities and Challenges for eCook Tanzania

This is an overview of the other reports with a section on each (to less depth than the individual reports). Key messages highlighted are:

- Households would adopt electricity for cooking – if the price and other conditions were right.
- Key drivers for adoption are cleanliness, ease of use, and time saving.
- Barriers are affordability, availability and reliability concerns (battery integrated eCook can address the latter two).
- The cost is not yet there (2018) but trends suggest affordability can be reached in 2020.
- EPCs are suitable for Tanzanian cuisine and a move directly to them may be possible.
- Policies are favorable for eCook.



What, when, how do people cook?

Cooking Diaries

22 urban households in Dar es Salaam kept detailed cooking diaries, recording what, when, and how they cooked. They spent 2 weeks cooking as usual, and 4 weeks using a range of electrical appliances. Key findings:

- Cooking with electricity is compatible with Tanzanian cuisine.
- The EPC is particularly suitable because it reduces boiling time by half on ‘long boiling’ dishes. EPCs can also fry.
- Therefore, off-the-shelf EPCs can be promoted to grid-connected households already.
- Blackouts/brownouts are the biggest cause of reverting back from electric cooking to other cooking means – battery supported eCook would mitigate this.
- Water heating is frequent and must be included in design of eCook.



Practices, aspirations, and eCook potential

Focus Group Discussions

- 4 focus group discussions were carried out, including cooking demonstrations.
- LPG is the aspirational cooking fuel, but cooking with electricity and energy-efficient appliances (e.g.: EPC) is attractive due to ease and convenience.
- Main barriers to eCook: access, actual and perceived affordability, reliability concerns. Safety is a secondary concern.
- Positive feedback received on energy-efficient appliances (EPC, rice cooker): ease of cooking, saving time, ability to multi-task, can cook 'heavy' foods which are not cooked on LPG.
- Negative feedback received on hotplates: slow.
- It is mostly women who do the cooking, however there is potential for eCook to catalyze change and men to be more involved.

eCook and the Tanzanian Gender Context

Gender

This report presents a gendered analysis of how the eCook concept might fit into the Tanzanian context:

- Time saving & drudgery reduction – eCook can make fuel collection and cooking quicker and easier.
- Income generation – time saved could be spent cooking as a business, or on other income-generating activities.
- Uptake – marketing campaigns should target both genders as household purchase decisions are likely to be made together.
- Transformation of gender roles – ease and time saving may mean men are willing to take on more responsibility in the kitchen.

Prototyping

- The prototype consisted of: 1.2kWh lithium-ion (LiFePO₄) battery + 800W inverter/charger + 30A solar controller + insulated electric cooking appliances.
- Can do a full day's cooking for a small household cooking with energy efficient appliances.
- Highly successful at demonstrating eCooking concept to stakeholders.
- There was a challenge with component availability and affordability (particularly LiFePO₄ batteries).
- Total cost = 1,480 USD, but given large scope for optimization a mass-produced unit would be significantly less.
- Development of DC appliances would remove need for inverter.

What design features are most important?

Discrete Choice Modelling

- $\frac{3}{4}$ respondents were from urban Dar es Salaam, $\frac{1}{4}$ from a rural town. The majority were female.
- See report for nuanced detail – for example:
 - Respondents classed as ‘deprived’, ‘older’, or ‘rural’ preferred smoky flavor.
 - Women preferred using a lid; avoiding smoke; ability to fry and boil; use of 2 hobs; - more so than men.
- This report also includes a wealth of information on cooking practices (expenditures and behaviors).



National Stakeholders Workshop

- Held at TaTEDO office, Mbezi Juu near KKKT Church, Dar es Salaam on 24th and 25th April 2018.
- Included stakeholders such as: Ministry of Energy, Ministry of Natural Resources and Tourism, TANESCO, Mobisol, Ensol, TaTEDO, Gamos, CEEEZ, DIT, UDASM and some of the eCook project participants.
- Discussed what coordinated action is required to overcome key eCook barriers.
- Attendees experimented with using eCook appliances, and discussed how eCook can be tailored to best meet the needs of Tanzanian cooks, in particular, those from lower income households, located in urban, pre-urban or rural areas.



Policy and National Markets

- There is a strong market for eCook products and services in Tanzania, but financing must be carefully considered both for suppliers and users.
- Policy support exists for key eCook drivers: environmental protection, health, gender equity, energy access.
- To date, progress on clean cooking has lagged behind electrification – eCook can unite these 2 domains.
- Grid eCook: Already possible for urban households; would increase demand and revenue for TANESCO; integrated batteries would reduce peak electricity demand.
- Mini-grid eCook: TZ has a world leading mini-grid sector and there are diverse opportunities of eCook integration around integrated household battery storage and time-of-use tariffs.
- PV eCook: The SHS market is developing rapidly, providing opportunity for integrating eCook into standalone PV systems.
- Policy must ensure quality eCook products & components can be imported without taxes & poor quality items are kept out.



Electric Pressure Cookers



+ PROS

- **Fast** – a pressure cooker raises the temperature above boiling point.
- **Cheap** – it is energy efficient. There is insulation around the pot so that the heat stays in there.
- **Convenient** – the whole cooking process is automated. Once you set the time, the temperature is controlled by the EPC, so that you can go off and do other things
- Can **fry, boil, steam** and even **bake!**
- **Safer** than ordinary sufarias – locks shut when pressurised.
- **Less stirring and water** needed – completely sealed during pressure cooking, so food cannot dry out
- **Lid can be taken on and off freely** when frying, boiling, steaming or baking.

- CONS

- Not ideal for certain dishes such as mandazis (deep frying) or chapatis, where you need to manually control heat or use a shallow pan.
- Not yet available in most Kenyan stores.
- The appliance costs about twice as much as an electric hotplate.
- Looks complicated at first,

From: Leary, J., & Fodio Todd, J. (2019). *The Kenya eCookbook* (Beans & Cereals Edition).



TANZANIA TRADITIONAL ENERGY
DEVELOPMENT ORGANIZATION
Centre for Sustainable Modern Energy Expertise



Innovate UK



References

- S. Batchelor, J. Leary, S. Sago, A. Minja, K. Chepkurui, E. Sawe, J. Shuma, M. Leach, N. Scott, E. Brown. 2019. *“Opportunities & Challenges for eCook Tanzania – October 2019 Working Paper.”* TaTEDO, Loughborough University, University of Surrey & Gamos Ltd.
- K. Chepkurui, Leary, J., Minja, A., Sago, S., Batchelor S., Sawe, E., Brown, E., Leach M., Scott, N., Shuma, J. 2019. *“eCook and Gender in Tanzania – March 2019 Final Report.”* TaTEDO, Loughborough University, University of Surrey & Gamos Ltd. eCook Tanzania Cooking Diaries (Oct 2019)
- J. Leary, S. Sago, A. Minja, S. Batchelor, K. Chepkurui, E. Sawe, J. Shuma, M. Leach, N. Scott, E. Brown. 2019. *“eCook Tanzania Prototyping – October 2019 Final Report.”* TaTEDO, Loughborough University, University of Surrey & Gamos Ltd.
- J. Leary, S. Batchelor, S. Sago, A. Minja, K. Chepkurui, E. Sawe, J. Shuma, M. Leach, N. Scott, E. Brown, F. Yamba. 2019. *“eCook Tanzania Focus Group Discussions Summary Report – March 2019 Final Report.”* TaTEDO, Loughborough University, University of Surrey & Gamos Ltd
- J. Leary, S. Batchelor, S. Sago, A. Minja, K. Chepkurui, E. Sawe, J. Shuma, M. Leach, N. Scott, E. Brown, F. Yamba. 2019. *“Policy & National Markets Review for eCook in Tanzania – October 2019 Working Paper.”* TaTEDO, Loughborough University, University of Surrey & Gamos Ltd.
- Villema, N., Sago, S., Sawe, E., Minja, A., Leary, J., Chepkurui, K., ... Leach, M. (2019). *“The National Stakeholders’ Solar Electric Cooking Workshop.”* TaTEDO, Loughborough University, University of Surrey & Gamos Ltd.
- J. Leary, N. Scott, S. Sago, A. Minja, S. Batchelor, K. Chepkurui, E. Sawe, Leach M., Brown, E. 2019. *“eCook Tanzania Cooking Diaries – October 2019 Working Paper.”* TaTEDO, Loughborough University, University of Surrey & Gamos Ltd.
- N. Scott, J. Leary, S. Sago, A. Minja, S. Batchelor, K. Chepkurui, E. Sawe, Leach M., Brown, E. 2019. *“eCook Tanzania Discrete Choice Modelling – October 2019 Working Paper.”* TaTEDO, Loughborough University, University of Surrey & Gamos Ltd.

