

# Translating community-based research on electrification into resources for policy and practice



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## Rationale

Access to electricity is a major issue in Tanzania – in rural areas, around 80% of households do not have access. As well as being an under-researched area, research often takes place in silos. Researchers tend to be based in the Global North, so there is an extractive nature to research that limits the impact it has on the ground. It had always been part of the research plan to conduct activities to disseminate the outcomes of my research. However, the COVID outbreak meant I had to end my fieldwork early and was not able to do this.



Copyright Hannah Mottram (2020) A shop being able to stay open late using electric light. This shop also has a fridge to sell cold drinks, but in the kitchen to the right women cook on an open fire.

## Key research aims

To translate outcomes from a research project on rural electrification in Tanzania into resources for policy makers, communities, and practitioners.

1. Making recommendations to improve experiences of rural electrification for communities, particularly households in poverty.
2. Transferring knowledge from community-based research to policy makers and practitioners.

## Summary of research activity

Firstly, we re-analysed data from 8 months of fieldwork in Tanzania from 2019/2020 to identify outputs that would be helpful for minigrid practitioners and policy makers.

We conducted interviews with 8 stakeholders based across Tanzania, who were identified through previous contacts and collaboration with the Tanzania Renewable Energy Association. This included a spread across academics, practitioners, and policy makers.

We wrote a first draft of a resource to communicate findings to stakeholders. This was shared amongst project participants to enable them to comment prior to the workshop. We then held an online workshop to present our findings, and to get direct input from participants on the resource.

## Methodologies

The initial fieldwork that this project was based on used a range of methods, including participatory approaches, interviews, focus groups, surveys and community observations. This fieldwork was completed for [Hannah Mottram's PhD](#). As the PhD focuses on academic outputs this funding has allowed us to collaborate with stakeholders in Tanzania to create a resource which meets their needs.

This specific project completed an evidence review, using data coded using a grounded theory approach in nVivo, identifying aspects of the research that could be helpful for mini-grid practitioners and policy makers. For example, we coded responses in interviews that referred to how companies could better support the community, and how people perceived the success of projects. We completed 8 additional semi-structured interviews with stakeholders in March and April 2022 to help us understand their perceptions of our findings, and to identify other issues they encounter. We held an online workshop in May 2022 which comprised a combination of presenting our findings and smaller focus groups for participants to discuss how the findings could be helpful to the sector. This workshop had 10 participants from across Tanzania including academics, NGOs, and mini-grid practitioners. We invited participants from Government, but they were not able to attend. Government restructuring following a change in president meant that our previous contacts were no longer in roles that could attend.

## Findings

Previous research has found that there is a lack of interdisciplinarity in research. As access to electricity is such a current and pressing issue, it is important that different sectors work together, including communities affected by the issues.

This research project re-analysed data collected as part of Hannah Mottram's fieldwork to help policy makers and practitioners. This data was collected using a range of qualitative and quantitative approaches, such as interviews, surveys, focus groups and data on tariff structures. Communities were involved in focus groups that formed the direction of the research, and in participatory activities throughout the project.



Copyright Hannah Mottram (2019) Solar panels providing access to electricity in a remote village in the Pwani region of Tanzania.

### **How to define success – importance of recognising multiple perspectives**

There are many ways that 'success' can be defined. Techno-economic measures could be the number of connections, income compared to expenditure and amount of outages and reliability of the project. Social measures include the impact on households and the community, particularly considering different socio-cultural-economic groups. There are interlinkages between different aspects – if households feel more included in a project, they may be more likely to pay bills on time, which means the mini-grid can be maintained, resulting in there being fewer outages and greater customer satisfaction. It is important to consider these measures together when considering whether a project is successful.

Participants identified techno-economic approaches as those most commonly used to measure success, but agreed that community experiences are also part of success.

### Tariff structures and inequality

We have found that poorer customers pay higher rates per unit on most mini-grid projects. Block tariffs, time of use tariffs and monthly charge tariffs mean that poorer customers with lower usage (e.g., just lights and phone charging) pay more (about double) per unit than customers with additional appliances. Companies preferentially connected wealthier customers. Customers were also aware of the significantly higher prices they pay compared with rates charged by TANESCO (1000-3000 TSh per unit vs 100 TSh per kWh). The table below puts these costs into context of incomes in Tanzania, and energy tariffs in the UK. These homes often have to make decisions about paying for electricity or buying nutritious food and paying for healthcare and schooling. Difficulties with high tariffs cause customers to self-disconnect and not use electricity for many days or months. Other issues with tariffs included customers not understanding how they worked and being frustrated that units would run out. Some companies use flexible payment plans to support households and do awareness campaigns so households have a better understanding of how they can use electricity.

	Cost per kWh (£)	Energy usage (kWh/month)	Cost per month	Low income per month	Percentage of income spent on energy
<b>Solar minigrid<sup>1</sup></b>	0.35 – 1.05	2.44	£0.85 - £2.56	£12.33	7-20%
<b>TANESCO</b>	0.035	2.44	£0.09	£12.33	0.7%
<b>UK<sup>2</sup></b>	0.21	300	£64.08	£1217	5%

Companies have a challenge as they need to be economically sustainable, but tariffs that are more economically efficient often introduce injustices, such as poorer households paying more per unit. Although our research can help them to consider distributional impacts of tariffs, they highlighted the importance of subsidies and state support for the poorest.

### Mini-grid planning

Research has found that many solar minigrid projects are oversized, leading to additional costs for communities and difficulties for practitioners. Two issues identified are customers not being able to pay tariffs (so expected demand not materialising), and difficulties in estimating demand. Analysis from one project shows that asking households about appliance usage can overestimate the peak usage but underestimates usage at night.

Mini-grid companies have told us that our analysis on this will help them to size their projects and has informed them on ways they should engage with communities more accurately.

<sup>1</sup> Data from fieldwork and <https://documents1.worldbank.org/curated/en/431111575939381087/pdf/Executive-Summary.pdf>

<sup>2</sup> <https://www.gov.uk/government/statistical-data-sets/annual-domestic-energy-price-statistics>

UK cost per kWh includes standing charge.

<https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/householddisposableincomeandinequality/financialyearending2021>

### **Barriers to opportunities**

Rural electrification has the potential to bring greater development to an area. However, this often doesn't manifest because there are other limitations such as poor roads and access to markets. Mini-grid companies and local government need to work together so projects are not implemented in silos but are able to bring a wider range of benefits to communities.

### **Financing**

Access to financing was raised as a major issue for mini-grid practitioners. This includes both large financing for implementing projects and micro-financing that would allow customers to purchase appliances. Participants said that there needs to be greater collaboration between different groups. At a national level this would include national and regional governments, UN agencies, such as UNIDO and Sustainable Energy for All, the Alliance for Rural Electrification, and donors and NGOs. Practitioners identified a need for skills in finding investors, completing feasibility studies and project design and implementation. Within communities, this would involve Vicoba and Saccoss groups (local microfinance organisations), electrical appliance vendors, other microfinance providers, village institutions and local people.

## Recommendations

### For academics/researchers

1. Involve stakeholders at multiple points during research and dissemination – allowing them to shape the formation of research and ensuring outputs meet their needs. This needs to consider existing power dynamics, and whose needs are currently unmet. Researchers need to maintain some independence, for example being able to report results which companies may not want to be published.
2. Recognise different sources of knowledge, particularly members of the community. Case studies are a good way of sharing this knowledge.
3. Most practitioners and policymakers will not read academic papers. Prepare information in a range of formats to improve impact, including learnings what has worked (or not).

### For practitioners

1. Community participation is necessary at all stages of projects. It is important to understand community context, such as how they generate income and what their needs are. This is also key for understanding demand, so projects are not oversized.
2. Fairness should be considered when designing tariffs. Often poorer households are excluded from connecting by high initial costs and tariffs. Some innovative approaches consider other services that could be delivered, such as charging batteries or smaller appliances or more diverse funding opportunities.

### For policy makers

1. Mini-grid companies need clear and reliable policies to be able to secure financing and implement projects.
2. Subsidies or other financial support are needed to implement projects that provide electricity to the poorest in society. Further research is needed into which models best support different groups.

### Outputs

1. Online workshop held 6<sup>th</sup> May 2022
2. Resource for policy makers and practitioners - circulated around our networks in Tanzania in June 2022 in [English](#) and [Swahili](#)
3. [Blog](#) and [social media outputs](#), including news article for [University of Sheffield Energy Institute](#)

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## Further Information

Link to project information on [FPRN website](#)

Project report available in [English](#) and [Swahili](#).

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## About the Funder

The Fuel Poverty Research Network (FPRN) was established in 2016 by researchers who were all concerned with different aspects of the interaction between people, homes and energy. The charity supports researchers and facilitates dialogue between researchers, policy and practice. FPRN's grant programme, Engaging in Energy Poverty in Early Career (EPEC), supports early career researchers (ECRs), postgraduate students (PGRs), and early career practitioners (ECPs) based in any country to contribute to efforts to tackle fuel and energy poverty through original research and publication.

**Cover Photo: Copyright Hannah Mottram (2019) Photo shows community workshop from fieldwork in Tanzania.**