UKRI – GCRF SIGMA Project

Sustainability, Inclusiveness and Governance of Mini-grids in Africa

Project Brochure

INTRODUCTION

The SIGMA project, a Global Challenge Research Fund project funded by UK Research and Innovation, aimed to improve our understanding of sustainability, inclusiveness and governance of mini-grids in general and those in sub-Saharan Africa. With comparative case studies from Senegal, Nigeria, Tanzania and Kenya, our key objectives in undertaking this research are to:

a) develop an evidence base in the performance of mini-grids in the case study countries;

b) undertake an analysis of existing business models and the policy framework in each case; and take forward analytical concepts of the political economy of decentralised electricity systems to understand the political drivers behind differences in the speed of adoption of mini-grids in different countries.

RESEARCH QUESTIONS

We have investigated four main research questions:

1) Which business models have succeeded to deliver financially and technically viable mini-grids in SSA?

2) Who and what have been the key beneficiaries of mini-grids in the case study countries and in what way?

3) Who drives or hinders the proliferation and the speed of adoption of mini-grids in East and West Africa?

4) What governance, regulatory and policy frameworks for decentralised systems of electricity provision exist in each case study country, how successful have they been and how do they differ?

ACTIVITIES UNDERTAKEN

The SIGMA project has undertaken a wide range of activities to meet our research objectives:

- Literature Review – Wide-ranging review of literature on project themes of sustainability, inclusiveness and governance for each partner country context. Literature review results presented at 04.02.22 webinar.
- Mini-Grids Database – ECREEE compiled a database of existing and proposed mini-grids in our partner countries to find the current state of the market
- Frameworks for Mini-Grid Performance and Sustainability Analysis – SIGMA researchers have produced both an indicator-based framework for mini-grid

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sustainability analysis, and an analytical framework using data envelopment analysis for mini-grid performance.

- Fieldwork – Partners in Kenya, Nigeria, Tanzania and Senegal hav e undertaken extensive fieldwork activities, including visits to a variety of mini-grids sites and stakeholder and key informant interviews with governments, regulators and mini-grid developers
- Country case studies – SIGMA researchers have summarised country-level outcomes in our series of fieldwork reports and working papers
- Collaboration, networking and capacity-building – SIGMA partners have undertaken a number of in-country networking and capacity-building events, facilitating South-South and North-South knowledge exchange and building networks of practitioners, governments, private sector and third sector actors in the mini-grid space

- Dissemination – In addition to our working paper series, SIGMA researchers have been published in *Energy Policy*, as well as presenting at the Gender and Inclusion Summit 2022, COP27 and COP28, and the 4th International Conference on Solar Technologies & Hybrid Mini Grids to Improve Energy Access. In addition, we have run events with the Nigerian Rural Electrification Agency, collaborated on reports with PeopleSun, and run our own webinar series and high-level policy dialogue sessions

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HIGHLIGHTED OUTPUTS

- Sesan, T. et al (2024) Exploring the Connections between Mini-Grid Market Regulation and Energy Access Expansion: The Case of Nigeria. *Energy Policy*, 184, pp. 113891
- "Of monopolies and mini grids: the evolving governance of decentralised electricity in Kenya, Tanzania, Nigeria and Senegal" – Lucy Baker, s-@ccess 2023
- "Household innovation & agency in mini grid energy access & use: A case study of households in Kenya" – Rosebella Nyumba et al, s-@ccess 2023
- "Strengthening commercial viability through greater inclusion in mini grids: Insights from Nigeria" – Temilade Sesan et al, s-@ccess 2023
- "The Role of Mobile Non-Road Machinery Electrification in Offgrid Areas: Some Reflections" – Subhes Bhattacharyya, Non-Road Mobile Machinery Electrification and Hybridization Forum 2023
- SIGMA Working Paper Series 1 – 4
    - Of Monopolies and Mini-Grids: Case Studies from Kenya, Tanzania, Nigeria and Senegal
    - On the Technical Sustainability of Mini-Grids in Developing Countries: A Comprehensive Review of Literature
    - Understanding Business Models and Access to Finance for Mini Grid Development in sub-Saharan Africa
    - Mini-Grid Performance Analysis using Data Envelopment Analysis

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