

Smart Household Energy Mix Optimisation Platform for Mixed-Income Urban Households in Tanzania

Problem Statement

Urban households in rapidly growing African cities such as Dar es Salaam face rising energy costs, unreliable supply, and continued dependence on inefficient or polluting fuels. Despite increased access to grid electricity and solar technologies, households lack decision-support tools to determine the most affordable, reliable, and inclusive combination of energy sources tailored to their income levels and usage patterns.

This results in:

- High household energy expenditure
- Inefficient appliance use
- Continued reliance on charcoal and biomass
- Limited uptake of integrated clean energy solutions

The Innovation

This project builds on a peer-reviewed household energy mix optimisation model, developed using Dar es Salaam as a case study. The model applies data-driven optimisation techniques to identify the most cost-effective and reliable combination of:

- Grid electricity
- Solar PV
- Energy storage
- LPG/gas
- Energy-efficient appliances

The innovation will transform this validated model into a deployable digital decision-support platform for mixed-income urban households.

Target Users and Inclusion Focus

The primary beneficiaries are low- and middle-income urban households, with specific attention to:

- Energy affordability
- Reliability for cooling, lighting, and productive uses
- Reduction of biomass dependence
- Inclusive access (“leaving no one behind”)

Secondary beneficiaries include:

- Utilities and city planners

- Clean energy service providers
- Policy stakeholders

Proposed Pilot and Activities

Pilot location: Dar es Salaam, Tanzania

Pilot scale: ~300 households (mixed-income)

Key activities:

- Household energy audits and demand profiling
- Platform development and localisation
- Deployment of optimised energy configurations
- Monitoring, evaluation, and learning (MEL)
- Socio-economic impact assessment

Expected Impact

- 50–60% reduction in household energy costs (model-based estimate)
- Reduced biomass and charcoal use
- Improved energy reliability and cooling access
- Scalable model for other LMIC cities

Partnership Structure (Energy Catalyst compliant)

UK Lead Partner (required):

- Lead applicant and grant holder
- Platform development and systems integration
- Grant management and reporting
- Commercialisation and scale-up strategy

LMIC Innovation Partner (Tanzania – applicant):

- Originator of the optimisation model (peer-reviewed)
- Local technical lead and pilot coordinator
- Household engagement and data collection
- In-country stakeholder liaison

Funding and Timeline (Indicative)

Total funding sought: £250k–£450k

Project duration: 18–24 months

LMIC partner share: 20–35% (implementation and technical contribution)

IP and Commercialisation

The optimisation model is the intellectual property of the LMIC innovator and will be licensed for project use.

IP ownership, licensing, and revenue-sharing arrangements will be agreed in the consortium agreement in line with Innovate UK guidelines.

Call for UK Partners

This opportunity seeks a UK-registered organisation with experience in:

- Energy systems modelling
- Digital platforms or optimisation tools
- Clean energy deployment
- Energy Catalyst or Innovate UK programmes

Contact:

Nuhu Nihamba

Chemical and Process Engineer | LMIC Energy Innovator

Dar es Salaam, Tanzania

nuhuseith@gmail.com