



Urban Pathways

Sustainable energy access through Solar PV Hubs and development of productive user cases to strengthen the Lake Victoria Economy and livelihoods, Western Kenya (Rural- Homabay, Urban- Kisumu)

Participants and roles

1. WE!Hub Victoria Limited (WeTu) (Local demonstrator)
2. Blekinge Institute of Technology (BTH) (Research partner – provide technical support)
3. Basic Internet Foundation (BIF) – (Technology provider Internet information spots)
4. UN Habitat and UNEP (Project partner - capacity building and policy support)
5. Local innovators will be engaged to develop components of the innovations such as the electric two wheelers and second life appliances of lithium battery cells.
6. Leitat and Metanogenia (technology provider and trainer biogas/waste-to-energy)

Context, motivation and objectives

The main objective is to develop a modular demonstration project to provide sustainable energy access solutions that are relevant for validation and replication in both urbanized and rural contexts in Africa, creating opportunities to generate sustainable off-grid electricity, with sector linkages such as cooking, lighting, fishing, water pumping, mobility and waste management, and combining energy solutions with local InfoSpots for access to information, on energy and digital skills.

Western Kenya is a key development region for Kenya providing a gateway to the rest of the East African region. One of its greatest natural resources, Lake Victoria, is the largest freshwater lake in Africa and a key source of livelihood for the rural and urban communities adjacent to it.

The Lake is an important revenue earner for the country as a huge proportion of fish distributed in Kenya is sourced from the lake and irrigation schemes are also dependent on it. The agricultural and fishing sectors dominate as key income drivers. In addition, there is a large number of micro and small businesses, mostly consisting of market trade, small retail products, artisanal services, small scale construction and transport as well as some larger wholesale outlets.

More than 40% of the local population live below the poverty line with many facing the challenge of poor access to affordable electricity, dependence on fossil fuel energy, unemployment and lack of clean drinking water

Challenge

1. Rural communities: Most of the smaller fishing communities are still not connected to the national electricity grid while the larger population lacks access to clean drinking water opting to drink water from Lake Victoria which is not safe for human consumption.
2. The urban poor: A significant portion of the urban households are considered poor and have a challenge accessing affordable electricity. Consequently, they opt for insecure connections characterized by unreliable power supply and power black outs on a daily basis.
3. Small Businesses: Access to electricity for small entrepreneurs is difficult due to the high cost and unreliability of grid power. Energy from fuel generators is often used which is price intensive for small business owners and environmentally unfriendly.
4. Fish Value Chain: In both the rural and urban context, fishermen are using old fashioned technology such as pressure lanterns or lead acid batteries for night fishing, which is more costly than modern lithium-ion battery lanterns and not environmentally friendly. The lack of adequate cooling services greatly increases post-harvest losses in the value chain. There are also significant losses in traditional fish drying in periods of cold and wet weather. There is currently no alternative method for fish drying available.

Innovative approach and contribution to the project

1. Establishment of self-sufficient rural-urban solar energy hubs that provide affordable and inclusive access to renewable energy for communities that cannot afford electricity from the main grid. Innovative business models with sharing and circular economy approaches for the different user cases, enabling the diversification of the economic base by making it possible for rural communities to own, deepen and move beyond traditional economic activities.
2. Development of new innovative products: lithium-ion battery packs for household and business use cases, solar cooling solutions (ice and cold storage for fish and agriculture products), solar fish drying services, locally manufactured electric vehicles (two wheelers), appliances for agricultural use, solar water pumping, state of the art water filtration systems, biogas/waste-to-energy for clean cooking and e-waste management..
3. Knowledge documentation, generation and dissemination of innovative practices within a developing context by working hand-in-hand with academic and industrial partners as the innovations are implemented.

Expected results

1. One off grid solar charging hub in a rural context (a fishing and farming community) and one solar charging hub in a peri-urban environment. Each hub will have a fully functional 40 to 50 kW solar power system to charge batteries and power equipment.
2. Development of user cases of energy for productive use at both hubs (electric motorcycles, battery pack, fishing lantern, fish drying/cooling, solar water pumping and filtration)
3. Proof of Concept for business models for energy use cases based on a sharing and circular economy approach
4. Two electronic waste collection centers at both Hubs with further treatment in the WeTu pre-processing plant in Homa Bay
5. Technical blueprint for PV Hub and analysis of energy consumption of user cases
6. Improvement of circular economy mechanisms (co-design of products to facilitate repair and second life use of Lithium Battery Cells)

Sustainability, replicability

The Solar Hubs generate energy in a sustainable way that is independent of the national grid. Through the development of a technical blueprint of the PV Hub and an energy consumer analysis, the technical model can be easily adapted to the energy needs for different contexts. User cases can be replicated or modified. The innovative technical approaches, based on the sharing and circular economy, also contribute to the sustainability of the model through community ownership, reparability, and reduction of resources consumption. The Knowledge & Research Platform is key as it will document each process of the implementation and lessons learned providing a reliable reference point for future projects modelled along the same approach.

Expected impacts

1. Increased natural resource efficiency (use of solar, water) and productivity for higher economic growth (link to SDG 7 - Affordable and clean energy)
2. A rise in rural employment and creation of direct jobs for operators and technicians at the hubs as well as indirect jobs for local entrepreneurs, fishermen, farmers and special groups (women, youth and low-income groups), (link to SDG 8 - Decent work and economic growth)
3. Innovative business models for a circular and sharing economy, and innovative technologies for fishing, cooking, lighting, e-mobility, second life use of battery cells, e-waste collection etc. (link to SDG 7 - Affordable and clean energy)
4. Positive impact on the environment through generation and use of clean, renewable energy, reduction of CO₂ emissions from the energy sector, and introduction of environmentally friendly alternatives to traditional domestic and economic activities. (link to SDG 13- Climate Action)
5. Generation, documentation and dissemination of knowledge through the Knowledge & Research Platform

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