



DEVELOPING MINI-GRIDS: HOW TO BUILD SUSTAINABLE AND SCALABLE BUSINESS MODELS

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Rural Electrification Authority -Zambia

PRESENTATION OUTLINE

1. Brief About Zambia
2. Rural Electrification Authority (REA)
3. Developing Mini Grids
4. Lessons learnt by REA in promoting Mini-Grids
5. REA's perspective on enhancing the sustainability of mini grids
6. Way forward

Brief About Zambia

- ❑ Zambia is a landlocked country in South Central Africa, bordered by 8 countries: Angola, Botswana, Democratic Republic of the Congo (DRC), Malawi, Mozambique, Namibia, Tanzania and Zimbabwe.
- ❑ Geographic area is 752,614 sq km.
- ❑ Zambia is subdivided into ten provinces, with a total population of 15.5 million.
- ❑ Energy sources include; electricity, petroleum, coal, biomass and renewable energy.
- ❑ The breakdown of the energy mix is: Hydropower generation 89% (2269MW) while the balance of 11% consist of Coal 6% (150MW), Diesel 3% (92MW), Heavy Fuel Oil (HFO) 2% (50MW) and Solar Photovoltaic (PV) generation plants 0.06MW.
- ❑ Electricity Access – 31.2% Nat. 67.7% Urban and 3.7% Rural

Rural Electrification Authority (REA)

- ❑ Rural Electrification Authority (REA) and the Rural Electrification Fund (REF) were established through the Rural Electrification Act No. 20 of 2003
- ❑ REA administers and manages the REF which it uses to implement the rural electrification program
- ❑ The overall mandate of REA is to provide electricity infrastructure to rural areas using appropriate technologies
- ❑ Rural Electrification Master Plan- Target 3.1% to 51% by the year 2030
- ❑ REA has subsidy provisions for providing support to promoters of renewable energy based projects

Developing Mini Grids

Existing Mini-Grids

❏ **Mpanta Solar Mini- Grid – (60 Kilo-watt peak (kWp))**

- Location - Samfya District of Luapula Province of Zambia
- Started its operations in 2013
- Target population/connections – over 450 Households, 2 public institutions and business entities
- Total cost - approximately USD1.2 million.
- Tariff charge - fixed monthly fee of about USD 4 to 10.
- The power plant is managed by the community through Kafita Cooperative Society.

Developing Mini Grids Conti...

Mini-Grids Under Development

❑ Lunga Solar Mini-Grid (300kWp)

- **Location** - Kasomalunga island, Lunga District of Luapula Province
- **Current Status** - Civil works
- **Estimated investment requirement** - approximately USD2.7 million
- **Population/connections** - 1,600 Households, Public institutions and Business entities.

❑ Chunga Solar Mini-Grid (200kWp)

- **Location** - Kafue National Park, Mumbwa District of Central Province.
- **Current Status** - Civil works
- **Estimated investment requirement** - approximately USD1.2 million
- **Population/connections** - 65 Households, public institutions and business entities

❑ Kasanjiku Mini Hydro Mini-Grid (640kW)

- **Location** - Mwinilunga District of North Western Province
- **Current Status** - Civil works and construction of access road
- **Estimated investment requirement** - approximately USD10 million
- **Population/connections** - 2000 household, public institutions and business entities

Lessons learnt by REA in promoting Mini-Grids

- ❑ Initial Investment costs are high
- ❑ Requires specialised skills to build but not to maintain
- ❑ There is need for efficient collection of (money) electricity bills e.g. prepaid billing system
- ❑ Connection Fee can bring about an initial commitment
- ❑ The community can be innovative and become efficient by engaging in productive uses of electricity. Over the 3 years the plant has been operating, the revenue has dropped and the cooperative has come up with a strategy for diversifying its operation. Other business entities have come on stream (poultry, piggery, hammer milling and fish farming)
- ❑ There is need to have anchor loads capable of paying a cost reflective tariff to meet the costs of operation and maintenance of mini-grids
- ❑ Private sector are not keen in operating isolated grid mini-grids because of low income levels resulting in low levels of fees collected which can not allow them to operate sustainably

REA's perspective on enhancing the sustainability of mini grids

- ❑ Need for anchor loads capable of paying a cost reflective tariff to meet the costs of operation and maintenance of mini-grids
- ❑ Training is very important to achieve sustainability
- ❑ Community involvement in the project
- ❑ Hybrids can bring about sustainability
 - **Chunga** – Use of existing Diesel Generator to reduce the battery bank thereby reducing the cost of the Solar Plant
 - **Lunga** – Wind Resource Assessment in order to have a hybrid with the Solar mini grid
 - REA is considering undertaking a feasibility study for development of biogas hybrid with solar minigrid at Mpanta

Way forward

- ❑ REA has engaged a Consultant to look into the best possible approach of making Mini-grids more sustainable
- ❑ Develop Master Plan for development of mini-grids
- ❑ Government should encourage local manufacturing of equipment for Mini grids – turbines, generators, transformers, conductors etc
- ❑ Government should deliberately set up Research Development Centres in Mini-grids. This could also be done by partnering with established R&D institutes.

60kW MPANTA SOLAR MINI GRID PLANT



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