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 USD 1.2 million.
  
  - **Tariff charge** - fixed monthly fee of about USD 4 to 10.
  
  - **The power plant is managed by the community through Kafita Cooperative Society.**
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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