Demonstrating the commercial viability of rural Clean Energy Mini-Grids (CEMG) in Mozambique

UNEP project in development by EDP, SAN-JFS, FUNAE, EDM

PROJECT BRIEFING FOR WEBINAR
“Towards Energy Access in Mozambique”

15 December 2015
There is a strong *rationale* and opportunity to implement CEMGs in Mozambique

**Rationale for Access to Energy (A2E)**

- A2E is key for human development

- However, grid extension is very expensive for electrifying rural areas

- CEMG is the faster and cleaner way to supply electricity for rural population (~600 million people)

- Proven technologies
- Lower cost than diesel
- Revenues need to cover investment and O&M&M
- Investment needs subsidies

**Opportunity in Mozambique**

- In Mozambique, more than 70% of the population does not have access to electricity, representing a potential market of 17 million people

- In Niassa region, even more than 85% of population with lack of electricity

- In January 2014, EDP joined the UNEP’s programme to create an international Case Study
Titimane village is located in Cuamba district, Niassa Province, crossed by a dirt road from Cuamba and a railway between Malawi and Nacala.
Titimane village is cartographed and socio-economic profiles of almost all families and businesses were identified.

- 825 Households
- > 4000 Inhabitants
- 44 small businesses
- 500-700 cotton farmers
This project contributes to sustainable growth and benefits several key stakeholders

**Population**
- A2E increases comfort and develops economic activities of low income people
- Modern, less polluting, energy sources for lighting, appliances, healthcare and education
- Farmers can sell cotton residues to be used to generate the electricity they will consume

**Mozambican Government**
- Supports the aim to increase rural electrification, and encourage replication
- Enables private investments through a relatively low public financial commitment
- FUNAE promotes development, production and use of different forms of low cost power
- Encourages global partnerships to care for the environment and reduce emissions
- Allows demonstration of CEMG as an investment opportunity in African countries
- Reinforces commitment to the CEMG High Impact Opportunity in the UN SE4All

**UNEP**
- UNEP and AfDB are aligning common agendas and exploring complementary activities to bring sustainable CEMG to Mozambique, supporting the necessary policy and regulatory development for these applications.

**AfDB**
- Promotes the strategic partnership with the Mozambican Government and EDM, reinforcing the commitment to invest in the country
- Develops new opportunities by testing new business and technological models
- Reinforces commitment to the CEMG High Impact Opportunity in the UN SE4All

**EDP**
- Reinforces the commitment to the development and well being of the Mozambican population
- Allows for the increase of Titimane farmers’ income, by purchasing their cotton residues and providing electricity
- Converts cotton residues in raw materials for production, avoiding its combustion in open fields

**SAN-JFS**

**Social Dimension**
- 4000 people with A2E
- 500 to 700 farmers with new business
- 7 to 10 direct jobs created

**Environmental Dimension**
- Clean tech (Solar + Biomass)
- Avoided CO\(_2\) emissions (5kt/20years)

**Economic Dimension**
- Demonstrating the commercial viability of rural CEMG

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**SAN-JFS**
The delivery model will be supported in the creation of a new SPV to own and manage all assets.

**Technological model**

- **Power Plant**
  - Solar Energy
    - Solar PV Panels 100 kWp
  - Battery Storage
    - 340 kWh/48V Lead Acid
  - Biomass Gasifier Generators 4 x 15 KW
  - Backup Diesel Generators 70kVA + 30 kVA
  - Cotton waste pellets
  - Diesel
  - 150t/year avoided CO₂

- **Low Voltage Grid**
  - 3-phase 20 Km of lines 400 poles

- **Distribution Grid**
  - Street Lighting
    - 20 x LED fixture 35 W

- **Users’ Appliances**
  - Distribution Board
    - Meter’s display
    - Protection
      - 1 Lighting appliance
      - 1 Outlet for appliances

**Business model**

- **Government of Mozambique**
  - Permits and Concession Contract
  - Financial contribution

- **Private sector**
  - Investment
  - ROE

- **Donors**
  - Grants

**MINI UTILITY (SPV)**

- **CAPEX**: 100% subsidized (1.75 M€)
- **OPEX**: 100% covered by revenues

*Including the costs of replacement CapEx*

- Connection Fee and Pre-payment of electricity (energy based tariff)
- Payement of pellets, diesel and other O&M expenditures
- Goods & services

**Suppliers**

- Cotton waste pellets
- Pellet production and storage
- Local farmers

**Customers**

- Local Farmers
- Cotton residue
- Additional income

Demonstrating the commercial viability of rural Clean Energy Mini-Grids in Mozambique
The ongoing operations are commercially viable but public entities plus donors subsidize the business by financing the upfront CapEx costs.

**What costs are included?**
- Generation equipments
- Network infrastructure
- Customer meters
- Project management
- Biomass supply
- Diesel supply (backup)
- Maintenance
- Management and staff
- Replacement CapEx

**Who contributes?**
- Private entities: EDP 500 k€ + SAN-JFS 200 k€
- Public Entities: MITADER 190 k€
- Donors: EEP 660 k€ + OFID 200 k€
- Customers
The project is currently in its second year, with the aim of starting scale-up and replication to new locations by the end of year 4.

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**Assessment (2014/5)**
- Launching partnership UNEP/EDP
- Key Stakeholders engagement in Maputo
- Screening process of potential villages
- On-site assessment of two villages
- Technical and economic modeling for Titimane
- Joint Development Agreement (JDA) between partners

**Project Development (2015)**
- Development Plan
- Fundraising
- Definition of regulatory framework with all necessary permits in place
- Detailed market study in Titimane
- Definition of final technology specifications
- Start of procurement
- Business Plan
- Joint Implementation Agreement (JIA) between partners

**Project Implementation (2016)**
- Mini-utility company (SPV) to be created
- Mini-grid to be installed
- Raising awareness and build customer order list

**Operation and Maintenance (2017…)**
- Start electricity supply to customers
- Operation, maintenance and management (O&M&M)
- Monitoring & assessment of customer impact
- Continued promotion – local, national and international