



Energia Para Moçambique

# ACP-EU ENERGY FACILITY – SEMINAR BRUSSELS, 26-27 APRIL 2012



*PROJECT:*

## ELECTRIFICAÇÃO DA COMUNIDADE DE MAJAU DISTRITO DE MILANGE, PROVÍNCIA DA ZAMBÉZIA MOÇAMBIQUE



Sistema de Gestão da Qualidade com Certificado Nº PT08/02280  
Sistema de Gestão Ambiental com Certificado Nº PT10/03200



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## WHO ARE WE?



- ✘ **Fundo de Energia (Energy Fund) – FUNAE** is a public institution, created in 1997 (decree 24/97), under subordination of the Minister of Energy, with the mandate to promote rural electrification using other sources of energies.
  
- ✓ **Vision:** to become the reference institution in the dissemination and promotion of alternatives sources of energies e rural electrification.
  
- ✓ **Mission:** to promote the greater access to energy in a sustainable and rational way which contributes for the economic and social development of the country.
  
- ✓ **Values:** 1. Client Oriented; 2. Integrity, 3. Efficiency, 4. Team Working, 5. Effectiveness and 6. Change Oriented.



### **Overall:**

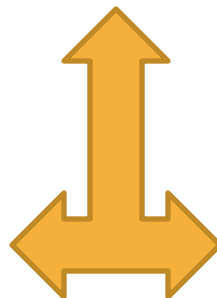
- Contribute to the improvement of living conditions of the poorest people of Majaua.

### **Specific:**

- Rehabilitation of the small hydro plant of Majaua to provide a sustainable supply of electricity.

### **PARPA II**

- To reduce the levels of absolute poverty; and
- To promote a rapid growth, sustainable and comprehensive economic.



### **PES**

- To reduce the poverty through privileged orientation of public services for poor populations; and
- To promote a economic development, with priority to rural areas and reducing regional imbalances.



## **BENEFICIARIES:**

- Aproximattely 20,000 people (5,000 households)
  - ✓ 6 villages
  - ✓ 3 Primary Schools
  - ✓ 1 Health Center
  - ✓ 6 community grinding mills

## **EXPECTED RESULTS:**

- Ensure adequate coverage by the new service
- Ensure a significant adherence to the service in order to guarantee the promotion of rapid growth, sustainable and comprehensive economic.



**KICK-OF MEETING WITH THE COMMUNITY**

## ➤ Small Hydro Power

- Capacity – 530 kW
- Net head – 15.2 m
- Flow – 4 m<sup>3</sup>/s
- Ossberger Cross-Flow Turbine, from Germany
  - Efficiency – 84%, N = 180 rpm
  - Advantages: Self-cleaning debris; reliable and flexible to the variations of flow and load (at least 10% for operation), what will allow higher overall yield of hydroelectric throughout the year, and also therefore ideal for off-grid system.
- Three-phase Synchronous Generator, Brushless, Self-excited, Self-ventilated, from Germany
  - 575 kVA, 50 Hz, 400 V Star, Power factor 0.8, N = 1000 rpm
- Annual Production - ~ 3,500 MWh/year

## ➤ Media Voltage Power Line

- 10 km length, 33 kV, 4 transformers 33/0.4 kV (1x250 kVA, 2x100kVA, 1x50kVA)

## ➤ Low Voltage Power Line

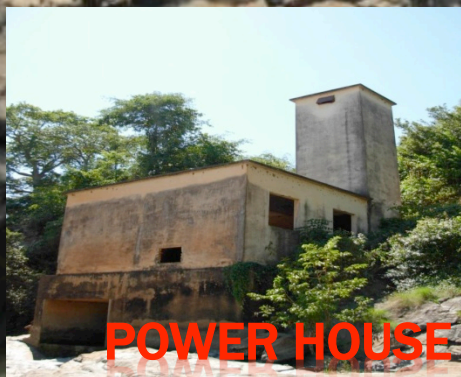
- 16 km length, supply and installations of ready boards to the final beneficiaries, street lighting.



**THE WEIR**



**THE CANAL**



**POWER HOUSE**



**WATER FALLS**



- Existing old small hydro power plant (damaged), in Ruo River, Majaua Community, Milange District in Province of Zambézia:
  - Weir and intake
  - Canal and forebay
  - Penstock – 25 m length and 1300 m diameter
  - Power house
  
- Locally stones, sand from the river
  
- ***Important:*** All the equipment to be used will respect origin rules from EU Guidelines



**THE WEIR**

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- Studies and draft – 110,000.00 €
- Rehabilitation of the SHP – 2,485,510.50 €
- Rural Electrification – 951,549.60 €
- Supervision – 199,515.00 €
- ✘ **Total Investment Cost (in 2011) – 3,746,575.10 €**
  - 1,866,911.25 € – from EU (49.8%)
  - 1,879,663.85 € – from FUNAE (50.2%)
- ✘ **Initial approach (in 2007) – 2,489.215 €**
  - 1,866,911.25 € – from EU (75%)
  - 622,303.75 – from FUNAE (25%)



**INTAKE AND CANAL**

## IMPLEMENTATION TO DATE

- Preliminary studies
  - Done by FUNAE and partner Bruno & Lopes, Engenheiros Associados, Lda.
- Draft / Preliminary Project Design
  - Done by a consult services, AQUALOGUS, within **6 months** and consisted in:
    - Site inspection
    - Hydrological survey
    - Geological/Topographical surveys
    - Hydropower capacity assessment
    - Project design
    - Cost analysis
- Licenses/concession
  - Ongoing
- Coordination and Supervision
  - Ongoing



- Installation of yard
  - About to start by the contractor (CANAS/TAVEL)
- Access
  - About to start by the contractor (CANAS/TAVEL)
- The work of recovery and repair
  - About to start by the contractor (CANAS/TAVEL). **The consignment has been done at 15th September 2011.**
- Purchase and installation of hydro-mechanical equipment
  - Ongoing by the contractor CANAS/TAVEL
- Purchase and installation of the turbine and generator
  - Ongoing the manufacturing by the sub-contractor OSSBERGER (CANAS/TAVEL)
- Electrical Installations
  - Ongoing the preparation by the sub-contractor OSSBERGER (CANAS/TAVEL)



**PENSTOCK**





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## IMPLEMENTATION TO DATE (CONT...)



- Rural Electrification
  - Preparation of the design by the contractor CANAS/TAVEL
- Training and technical assistance
  - Awaiting
- Monitoring
  - Ongoing
- Dissemination
  - Done by FUNAE
- Visibility and Awareness
  - Ongoing from the beginning (continuous activity)





**POWERHOUSE**

- A mozambican team (local preferably) composed by:
  - Local authorities
  - 5 workers, technical skilled
  - 3 security officers
- Training using Operation and Maintenance Manuals compiled by FUNAE and Supervision's experts, based on all Documentations provided by the Contractors and Suppliers
- During the first year of operation, the team we will be technically assisted by experienced team from the Supervisor, Contractors and Suppliers
- The team will follow all installation work and commissioning of equipment in order to become familiar with the operation thereof, attend and participate in all operations and work to be performed during the commissioning and acceptance of equipment.
- The local authorities will assume the management of these, probably shared with a private company, and will make charges for services rendered.



**OLD FRANCIS TURBINE AND GENERATOR**

- The Management, Operation and Maintenance costs are approximately 100,000 €/year
  - Costs with the staff (multidisciplinary team)
  - Costs of normal Maintenance of equipment
  - Costs of special Maintenance of equipment
  - Costs of eventual damages
- Considering a minimum of 2.00 €/household a month for the first phase, we predict a total of 120,000 €/year
- This annual revenue will increase substantially with the industrial infrastructures, which will pay a social tariff (0.08 – 0.15 USD/kWh)
- **Important:** For the first 2 year of operation, the costs of special maintenance and eventual damages will be covered by the manufacture's guarantee.



TYPICAL HOUSE

- The target group has some experience in the use of electricity, since a small hydro plant worked there between 1971 and 1986 and was destroyed during the civil war
- The low social indexes as result of the electrical energy loss, ensure us the adherence of the project

### ***Challenges for the sustainability:***

- Compose a multidisciplinary team with the right technicians to guarantee a good Management, Operation and Maintenance of the Power Plant
- Continuous awareness for the ownership responsibility in taking care of the power plant, the adherence and better uses of electricity.



POSTO DE SAUDE DE M...



HEALTH CENTER



- The procurement procedures using EC guidelines take a long time. In consequence of that, the expectation created in the beginning, creates dissatisfaction among beneficiaries, as they come to think that the project is a mere propaganda. On other hand, the cost estimation changes along the time.

### *Important issues to avoid this situation:*

- Involvement of the local authorities and beneficiaries from the beginning of the project, will help all the parts involved in the implementation of the project (consultants, suppliers, etc.);
- The time frame for all process must be established in beginning and it's important to be as realistic as possible, in order to help in mobilization of resources on time;

## LESSONS LEARNED (CONT...)

- It's required the right indication of the time frame of the project in first contact with the potential beneficiaries
- It's better to take more time in the preparation of good tender dossier, that will save time in clarifications or cancellation of tender process;
- Well done cost estimate avoids the search for other sources of funding.
- It's required to keep a permanent communication with local authorities.



**SOME OTHER BUILDINGS**



**COMMUNITY DIESEL GRINDMILLS**



Electrificação da comunidade de  
Majaua, distrito de  
Milange, provincia da  
Zambézia.

**AWARENESS AND VISIBILITY**



**ASSIGNMENT FOR THE WORKS**



**LOCAL AUTHORITIES DURING THE ASSIGNMENT**



Energia para Moçambique

## CONTACT



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THANK YOU FOR YOUR KIND  
ATTENTION



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