ECOWAS Regional Training Workshop
Case Study Rwanda

Adapted from a presentation by:
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At the workshop:
RECP Opportunities for Rural Development in Africa
In Arusha, Tanzania, Sept. 5, 2013
## Musahara Mini-Hydro

### Developer
- **Amahoro Energy (SOGEMR)**

### Capacity
- 438 kW

### Water Storage
- N/A (Run-of-the-River Scheme)

### Construction
- 5 Years (Primary Delays: Funding)

### Development Costs
- EUR 1.3M
  - 20% Developer
  - 45% Debt
  - 35% GIZ EnDev Program Grant

### Annual Income
- EUR 350K

### Mini-Grid
- Original design to provide Shyra Hospital & Villages with 500 households
- Completed with National Grid Connection
- Constructed 6km of MV Transmission Line
The SPP operates as a combined SPP-SPD

Source:
Diagram by Richard Engel and Chris Greacen, 2013

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= Power from utility
= Power from SPP
M = Meter
Diversion Weir

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Case study Rwanda
Canal
Forebay
Penstock (120 m)
Powerhouse
Turbine
## Mini-grid info

<table>
<thead>
<tr>
<th>MiniGrid Technological Info</th>
<th>Factors</th>
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<tbody>
<tr>
<td>Power Plant Installed Capacity</td>
<td>• 438 kW</td>
</tr>
<tr>
<td>Capacity Factor</td>
<td>• 100% +</td>
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<tr>
<td>Cross-Flow Turbine</td>
<td>• 85% Efficiency</td>
</tr>
<tr>
<td>Control Units</td>
<td>• Siemens &amp; European</td>
</tr>
<tr>
<td>Electricity Storage</td>
<td>• N/A</td>
</tr>
<tr>
<td>Transmission Line</td>
<td>• National-Grid Standards</td>
</tr>
<tr>
<td></td>
<td>• 30kva MV Line</td>
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<tr>
<td></td>
<td>• Developer Contract</td>
</tr>
<tr>
<td></td>
<td>• National PowerCoOwnerships</td>
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<tr>
<td>Distribution Grid</td>
<td>• Project Designed to include Mini-Grid</td>
</tr>
<tr>
<td></td>
<td>(All Plants Connected to National-Grid)</td>
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<tr>
<td>National Grid Reasoning</td>
<td>• Unforeseen rapid national-grid expansion</td>
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<tr>
<td></td>
<td>• Increased Financial Viability (Banks now insist on</td>
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<td></td>
<td>IPP PPA’s with National Utility (EWSA))</td>
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<tr>
<td>National Grid Management</td>
<td>• Pre-payment Meters</td>
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Key lessons learned:

1. Private Plants perform better than Public Plants (Including Community-Run Plants)

2. Grid-Connected Plants are easier to become viable and sustainable than isolated ones

3. Conducive Regulatory Frameworks leads to greater Private Sector contributions to both Power Supply & Distribution
Five key factors required to develop a viable private sector led mini-grid project:

1. Financially viable business plan
2. Robust technical plan
3. Coherent and favourable policy environment
4. Strong plant ownership arrangements
5. Expertise (Technical & Management)
MHP development process gap

1. Site Identification
2. Planning
3. Financing & Procurement
4. Construction
5. Operations & Maintenance
Market trends in Rwanda

Rwanda is “open” to micro-hydro and mini-grids:

1. Strong regulatory environment
2. Strong and increased Private Sector Interest
3. All 20+ public micro hydro plants will be privatised
4. Off-grid connections are sought for 52% of Rwandan households (1.2 M) – (Solar PV & HydroPower)
5. Over 300 Micro-hydro sites available
6. Over 200 are Pico-hydro sites (10 Off-grid projects are now operational)
   » 0-5kw – 70+ Sites
   » 5-25kw – 90+ Sites
   » 25-50kw – 40+ Sites
7. Technical and financial support development agencies
   » GIZ EnDev Program
   » GVEP International
Rwanda Policy and Regulatory Framework

Overview:
The Electricity Law was approved by the Parliament in 2011

The regulatory body, the Rwanda Utilities Regulatory Authority (RURA) issues licenses to power producers, distributors, and transmitters.

MININFRA offers a MoU to the project developer to explore a specific site and develop a feasibility study.

After an agreement with the utility, the Rwandan Energy Group on the PPA, a concession agreement is signed between MININFRA and the project developer.

The regulatory agency RURA thereafter grants a generation license.
Rwanda Policy and Regulatory Framework

Grid Feed-in Tariffs (FiTs)

• Since 2012, a renewable energy feed-in tariff (REFIT) regulation for hydropower
• Offers a size-dependent tariff (inflation corrected)
• Stipulates to connect all IPPs within a 10 km distance to the grid at the cost of the utility
• The REFIT is valued in USD, although it can be paid in RW francs

Taxation

• For companies investing in rural areas, there are quite a few temporary tax exemptions
• The Rwanda Development Board (RDB) operates a one-stop centre offering foreign investors assistance with these processes
• For most renewable energy equipment, duty exemptions exist
• The process with RDB is transparent
Thank you for your attention!

The Partnership Dialogue Facility (EUEI PDF) currently receives contributions from the European Commission, Austria, Finland, Germany, Italy, the Netherlands and Sweden. EUEI PDF is an instrument of the EU Energy Initiative (EUEI).