Experiences of the Private Sector Participation in Micro-Hydro Power (PSP Hydro) project in Rwanda

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Benjamin Attigah
Programme Manager
GIZ / Energising Development (EnDev) Rwanda
a. Background & baseline
b. Activities
c. Results
d. Conclusion
Dutch–German Energy Partnership ‘Energising Development’ (EnDev)

18 countries (10 Africa, 4 Latin America, 4 Asia)
Background: GIZ PSP Hydro project

- **PSP Hydro** project is part of the global Dutch–German Energy Partnership ‘Energising Development’ (EnDev) which is implemented by GIZ
- PSP Hydro project is the *first attempt* in Rwanda to attract private commercial participation in micro-hydro power
- **Project duration**: 2006-2013
- **Objectives**:
  - to provide more people with electricity (through **MHP projects**)
  - to create a self-sustaining private sector micro hydropower capable of designing, building and operating MHPs after the closure of PSP Hydro (**sector development**)
- **Partner**: Ministry of Infrastructure (MININFRA); since 2011 Energy Water Sanitation Authority (EWSA)
Baseline: situation in 2006

- Growing electricity demand, very low generation capacity, limited national grid network
- Prevailing approach: 100% publicly financed MHP plants + community owned schemes (since 2005, by UNIDO)
- No private companies working in renewable energy in 2006
  - Low capacities (managerial, technical) of potential private developers and sub-contractors
  - Lack of own funds/collateral
- No political and legal framework for private investments:
  - No regulatory procedures, no Electricity law, etc.
- Zero experience of local banks in MHP / renewable energy
  - Concerned about unknown sector, lack of expertise, insufficient collateral of applicants to cover high guarantee requirements
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Project activities

Support to SMEs
- Technical Engineering Assistance*
- Business Plan Development*
- Financial support: subsidies of below 50% of investment costs
  - just enough to make project profitable (viability gap funding)
  - precondition: min. 15% equity & commercial loan (35 - 60%)

Sector Development / Regulatory framework
- Political support and institutional guidance
- Establishment of regulatory processes
- Assistance for sector consolidation
- Improve cooperation between stakeholders in the sector

* through local contractors
Tendering

**Stage 1:** Submission of *Expression of Interest* by the developers:
- Detailed description of the site to be developed
- Preliminary MoU with district authorities
- Estimation of customer potential
- References of project developers
- Proof of equity and likelihood of obtaining financial closure
- Rough cost estimate and indications of likely IRR

Evaluation of proposals by PSP Hydro and award of grant of € 5000 for complete Business Plan development

**Stage 2:** Submission of complete *Business Plan* and obtaining of financial closure

**Stage 3:** Provision of *limited co-financing* (max 50%, mostly 20-30%)
## Financing Mechanism

<table>
<thead>
<tr>
<th></th>
<th>Suggested contribution</th>
<th>REPRO (96 kW)</th>
<th>ENNY (500 kW)</th>
<th>SOGEMR (438 kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total costs in €</strong></td>
<td></td>
<td>313,579</td>
<td>1,686,415</td>
<td>1,415,113</td>
</tr>
<tr>
<td><strong>EnDev Grant</strong></td>
<td>max. 50%</td>
<td>50%</td>
<td>28.1%</td>
<td>23.8%</td>
</tr>
<tr>
<td><strong>Equity</strong></td>
<td>min. 15%</td>
<td>31.2%</td>
<td>25%</td>
<td>41.5%</td>
</tr>
<tr>
<td><strong>Loan</strong></td>
<td>~ 35%</td>
<td>18.8%</td>
<td>46.9%</td>
<td>34.7%</td>
</tr>
</tbody>
</table>
## Tendering II

- Call for Proposals from private sector in 2005, 2007 and 2009

<table>
<thead>
<tr>
<th>Year</th>
<th>Submitted</th>
<th>Improved</th>
<th>Selected</th>
<th>Contracted</th>
<th>Ongoing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006: Call 1</td>
<td>&gt; 20</td>
<td>15</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>2007: Call 2</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2009: Call 3</td>
<td>10</td>
<td>7 (+ 3)*</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

* Old sites from Call 1
Murunda Hydroelectric Power Plant (96kW)

- Operating since March 2010 without problems
- First ever privately owned and operated MHP plant in Rwanda
Mazimeru Hydropower Plant (500kW)

- Connected to grid April 2012
- First “wheeling” arrangement in Rwanda (SSA): sell to local tea factory by using national grid operated by EWSA
Musarara Hydropower Plant (438 kW)
Project activities II: Privatisation of MHPPs

- MININFRA/EWSA are now interested in privatisation of all publicly funded MHP plants below 2.500kW
  - EWSA not interested in management of smaller plants
  - Community managed plants not working efficiently

- PSP hydro studies:

<table>
<thead>
<tr>
<th>Name</th>
<th>Sponsor</th>
<th>Connection</th>
<th>Management</th>
<th>Capacity (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agatobwe</td>
<td>GoR, UNIDO</td>
<td>Off-grid</td>
<td>Community</td>
<td>200</td>
</tr>
<tr>
<td>Mutobo</td>
<td>GoR, UNIDO</td>
<td>Off-grid</td>
<td>Community</td>
<td>200</td>
</tr>
<tr>
<td>Nyamyotsi I</td>
<td>GoR, UNIDO</td>
<td>Off-grid</td>
<td>Community</td>
<td>100</td>
</tr>
<tr>
<td>Nyamyotsi II</td>
<td>GoR, UNIDO</td>
<td>Off-grid</td>
<td>Community</td>
<td>100</td>
</tr>
<tr>
<td>Rugezi</td>
<td>GoR</td>
<td>On-grid</td>
<td>EWSA</td>
<td>2.200</td>
</tr>
</tbody>
</table>
To be privatised MHP plants

Rugezi

Agatobwe

Mutobo

Nyamotsi I

Nyamotsi II
Privatisation of MHPPs (continued)

- **Findings** of ‘Privatisation Assessment report’
  - No cost information/design drawings provided by (Asian) constructor
  - Very poor operational records
  - Low load factors (esp. comm managed) > insufficient management capacity
  - Nyamyotsi I&II in poor physical condition, others mostly in good condition
  - Potential capacity not always what is developed (Mutobo, Nyamotsi)

- **Recommendations**
  - Lease gives higher returns to GoR than sale
  - Rehabilitation is attractive
  - Isolated grid not attractive, 100% feed-in/mix more attractive

- **Government** now wants to **privatise all MHP plants** in Rwanda
  - First step: Government ‘Steering committee’, then prepare tender

- Govt has started to **actively invite** private companies (Energy Investor Forum, February 2012), first proposals already coming in
a. Background & baseline
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Results: implementation level

- **Completion of the first privately owned and operated micro hydro power plant** (96 kW) in Rwanda in 2010
- 2 additional MHPPs (438 + 500 kW) to be completed soon; more MHPPs in planning stages
- First **wheeling arrangement** (MHPP selling to private Tea factory through EWSA grid) in Rwanda (Sub Saharan Africa?)
- Developers already working on **2nd and 3rd sites**
  - Original idea of creating a new private MHP sector
- **International investors** and other donors providing finance
- Rwandan **banks** have given first commercial loans to MHP projects
- MHPs developed with **limited public subsidies**
# Current Status of PSP Hydro Projects

<table>
<thead>
<tr>
<th>Company</th>
<th>Direct PSP support</th>
<th>Indirect support / spin-offs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Site</td>
<td>kW</td>
<td>Site</td>
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<td></td>
<td></td>
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<td>kW</td>
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<td></td>
<td></td>
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<td>kW</td>
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<tr>
<td><strong>ENNY</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Mazimeru</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maruruma</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rukarara 2</td>
<td>1985</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2635</td>
</tr>
<tr>
<td><strong>CALIMAX</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gasumo</td>
<td>80</td>
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<tr>
<td></td>
<td>Rubagabaga</td>
<td>314</td>
<td></td>
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<tr>
<td></td>
<td>Yungwe</td>
<td>100</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>494</td>
</tr>
<tr>
<td><strong>SOGEMR</strong></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Musarara</td>
<td>438</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mukungwa 3</td>
<td>2000</td>
<td></td>
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<tr>
<td></td>
<td>Giciye 2</td>
<td>4500</td>
<td></td>
</tr>
<tr>
<td></td>
<td>+ 5 others</td>
<td>1000</td>
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<td></td>
<td></td>
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<td>7938</td>
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<tr>
<td><strong>REGREPOWER</strong></td>
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<tr>
<td></td>
<td>Kavumu</td>
<td>285</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mukungwa 4</td>
<td>916.4</td>
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<tr>
<td></td>
<td>Mugambazi</td>
<td>439.5</td>
<td></td>
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<tr>
<td></td>
<td>Nshili 2</td>
<td>480.7</td>
<td></td>
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<tr>
<td></td>
<td>Umunywanzuki</td>
<td>556</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>2677.6</td>
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<td><strong>RED/REPRO</strong></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Mashyiga</td>
<td>140</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>140</td>
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<tr>
<td><strong>REPRO</strong></td>
<td>Murunda</td>
<td>96</td>
<td></td>
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<tr>
<td></td>
<td>n.a</td>
<td></td>
<td>1000</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1096</td>
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<td><strong>TOTAL</strong></td>
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<td></td>
<td></td>
<td></td>
<td>1,539</td>
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<td>13,441</td>
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<td></td>
<td></td>
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<td>14,980</td>
</tr>
</tbody>
</table>

*preliminary, early estimation based on MoUs with MININFRA/districts, pre/feasibility studies
Results: policy & legal framework

- Guidance and support for the establishment of a regulatory framework has led to **standardized procedures**: 
  - Clear process for **license** from regulator established 
  - Process for Memorandum of Understanding (**MoU**) with Ministry 
  - Existence of **environmental regulations** 
  - Establishment of standardized **PPAs** (utilised e.g. by solar firms) 
  - Establishment of a **feed-in tariff** negotiated – in Feb 2012 general REFIT programme introduced (see Annex)

- Government committed to **private sector driven approach**, neglect of 100% public / community managed approach 
- **Privatization** of publicly owned MHP plants initiated 
- Approach taken up by other **donor agencies** (e.g. World Bank)
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Private sector vs. public / community approach

- Private sector approach – advantages:
  - Reduces amount of public subsidies
  - Leveraging of private sector capital (already contributing 75% of investment costs)
  - More efficient and sustainable operation & maintenance
  - More utilisation and building of local capacity
  - Private companies able to build additional sites on their own with their own resources
  - **Upscaling** possible (not the case for community managed)
  - In general, expansion of private sector strengthens industrial structure of the country; employment creation
Thank you for your attention!

Benjamin Attigah
Energising Development (EnDev) Rwanda
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
M +250 (0) 78 830 1634
E benjamin.attigah@giz.de
I www.giz.de
Renewable Energy Feed-in Tariffs

- Feed-in tariff applicable to hydropower and mini-hydropower was issued in February 2012
- Calculated on cost plus return basis
- Differentiated by size
- Applicable to project sizes between 50 kW and 10 MW, program cap of 50 MW
- Reviewed after 3 years

Examples from Rwandan REFIT Tariff Schedule

<table>
<thead>
<tr>
<th>Tariff per kWh (in $ US)</th>
<th>Plants installed capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>16.6 cents</td>
<td>50 kW</td>
</tr>
<tr>
<td>12.9 cents</td>
<td>500 kW</td>
</tr>
<tr>
<td>7.2 cents</td>
<td>5 MW</td>
</tr>
<tr>
<td>6.7 cents</td>
<td>10 MW</td>
</tr>
</tbody>
</table>
More information

PSP Hydro project:

- Fact sheet: www.giz.de/themen/de/17218.htm


Renewable Energy Feed-in Tariffs (REFIT) for Rwanda:

- RURA website:
  www.rura.gov.rw/.../REGULATIONS_ON_FEED_TARIFFS_HYDROPOWER_PLANTS.pdf