Financing Mini-grids in Africa

Peter Weston, Director of Investment Advisory, Energy 4 Impact
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Introduction to Energy 4 Impact

Formerly known as GVEP International

Non-profit firm focused on off-grid energy in SSA

Provides business, technical, financial advice to SMEs and micro enterprises

Supported 40 mini-grid developers over last 10 yrs

Managing four mini-grid donor programs

Launch of SE4All Green Mini-grid Help Desk

http://greenmini-grid.se4all-Africa.org
Agenda

Mini-grid types

Challenges

Financial solutions

Guarantees

Financing trends
Mini-grid Types

- **Project Development Stage**
  - Early stage development
  - Late stage development
  - Implementation

- **Type of project**
  - Size and customer model
  - Technology

- **Type of Developer**
  - Origin (local/international)
  - Motivation (profit/non-profit)
## Mini-grid Types – Project Development Stage

<table>
<thead>
<tr>
<th></th>
<th>Early stage dev</th>
<th>Late stage dev</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project milestones</strong></td>
<td>Feasibility study</td>
<td>Land rights approved</td>
<td>Construction started</td>
</tr>
<tr>
<td></td>
<td>Site identification / initial community engagement</td>
<td>ESIA completed</td>
<td>Financing secured</td>
</tr>
<tr>
<td></td>
<td>Demand assessment</td>
<td>Water rights secured</td>
<td>PPA secured</td>
</tr>
<tr>
<td></td>
<td>Renewable resource assessed - hydro, biomass</td>
<td>Licences secured</td>
<td>Arrangements with small business users in place eg contracts, payment systems</td>
</tr>
<tr>
<td></td>
<td>Technical design</td>
<td>Tariffs approved</td>
<td></td>
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<tr>
<td></td>
<td>Anchor clients or small business users identified</td>
<td>Rules for community engagement</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tender for equip. supply</td>
<td></td>
</tr>
<tr>
<td><strong>Financing</strong></td>
<td>Grants or equity</td>
<td>Grants, equity, possibly debt</td>
<td>Grants, equity or debt</td>
</tr>
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<td></td>
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</tbody>
</table>
# Mini-grid Types – Size and Customer Model

<table>
<thead>
<tr>
<th></th>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size</strong></td>
<td>1-10 MW</td>
<td>100kW – 1 MW</td>
<td>&lt;100 kW</td>
</tr>
<tr>
<td><strong>Main customers</strong></td>
<td>Anchor load eg state utility, semi-industrial</td>
<td>Small business or anchor load</td>
<td>Households or small business</td>
</tr>
<tr>
<td><strong>PPA/FIT</strong></td>
<td>Yes</td>
<td>Yes/No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Financing</strong></td>
<td>Commercial equity and debt, grants for connections</td>
<td>Grants and equity generally required</td>
<td>Grants and equity generally required</td>
</tr>
<tr>
<td></td>
<td>Corporate or asset finance or project finance</td>
<td>Corporate or asset finance</td>
<td>Corporate or asset finance</td>
</tr>
</tbody>
</table>
Mini-grid Types – Technology

- **Solar**
  - Daytime demand load
  - Energy storage or diesel for evening consumption
- **Hydro**
  - Demand projections – demand not scalable up nor down
  - Hydrology flow data
  - Seasonality of flow
- **Biomass**
  - Securing feedstock
  - Logistics costs
  - Seasonality of biomass
Mini-grid Challenges

Weak market data and linkages
- Lack of reliable data
- Community relations
- Productive users

Policy/Regulation
- Cost reflective tariffs
- Licensing/permits
- Grid expansion
- Standards

Lack of capacity
- Public institutions
- Financial institutions
- Developers
- Skilled staff

Unproven Business Models
- Ownership
- Customers
- Size

Developers

Financing
Mini-grid Challenges - Financing

Grants
- High transaction costs
- Delays in disbursements
- Inflexible and too prescriptive

Loans
- Risk averse banks
- Collateral requirements
- Small deal size
- Lack of institutional capacity

RBF
- Depends on local capital market to fund construction
- Limited track record in delivering connections

Equity
- Lack of proven, scalable business models
- Low risk-adjusted returns
- Lack of exits

Developers
## Financial Solutions

<table>
<thead>
<tr>
<th>Grants and subsidies</th>
<th>Equity</th>
<th>Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grants for feasibility studies</td>
<td>Seed capital</td>
<td>Concessional or commercial loans</td>
</tr>
<tr>
<td>Construction grants for capex – focus on distribution assets</td>
<td>Expansion capital</td>
<td>Green credit lines to local banks</td>
</tr>
<tr>
<td>Results-Based Financing eg for new connections</td>
<td>Investments in operating assets</td>
<td>Loan refinancing facilities</td>
</tr>
<tr>
<td>Promotion of productive users - technical assistance / purchases of electrical equipment</td>
<td>Providers: angel investors, VC, impact investors, trusts and foundations, global utilities, private equity, family offices, crowd funding, DFIs (direct or via funds)</td>
<td>Loans to end users for electrical equipment</td>
</tr>
<tr>
<td><strong>Providers:</strong> DFIs, host governments, trusts and foundations, philanthropists</td>
<td></td>
<td>Providers: DFIs, banks, foundations, family offices, crowd funders</td>
</tr>
</tbody>
</table>
# Corporate versus Project Finance

<table>
<thead>
<tr>
<th>Corporate Finance</th>
<th>Project Finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment based on historical track record of developer and income projections of portfolio</td>
<td>Investment based on income projections of individual mini-grid or group of mini-grids</td>
</tr>
<tr>
<td>Suitable for Type 1, 2 and 3 mini-grids</td>
<td>Most suitable for Type 1 mini-grids with anchor clients that offer long-term contracted revenue streams</td>
</tr>
<tr>
<td>More freedom for developer on how they use funds eg between different projects</td>
<td>Funds only to be used for project(s) specified in financing agreement</td>
</tr>
<tr>
<td>Balance sheet impact on developer</td>
<td>Project risks shared between stakeholders</td>
</tr>
<tr>
<td>Shorter time to execute financing</td>
<td>Financing takes longer to execute</td>
</tr>
<tr>
<td>Simpler / less due diligence</td>
<td>Complex / more due diligence</td>
</tr>
<tr>
<td>Lower up-front costs</td>
<td>Higher up-front costs</td>
</tr>
<tr>
<td>Shorter-tenor financing</td>
<td>Longer-tenor financing</td>
</tr>
</tbody>
</table>
Guarantees

Risk Guarantees
- Demand growth
- Non payment or late payment of PPA
- Arrival of grid

Loan Guarantees
- Alignment of interest btw partner banks and mini-grids

FX Risk Hedging
- Natural hedging
- Local currency loans
- Hedging cost
Mini-grid Financing Trends

- New types of investors include global utilities, manufacturers, IPPs
  - Project investments
  - Corporate investments
  - Developers of own projects
- Bundled finance for similar mini-grids - technology, location, business model
- End user financing
  - Funded by developers themselves
  - Partnerships with financial institutions
Thank you!

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