Module 6

Mini-grid Funding Models

April 2020
Module overview

Introduction to the Module
- Learning objectives
- Module requirements
- Agenda

Topic 1
Financial Challenges

Topic 2
Financial Solutions

Topic 3
Financial Modelling

End of Module
- Case studies
- Module recap
- Further reading
Objectives & Requirements

Learning Objectives

- Learn about the financial risks and challenges for mini-grid developers and their funders.
- Learn about the wide range of financial products and solutions available to developers.
- Includes an introduction to financial models for non-financing specialists and case studies of innovative funding models.

Module Requirements

- This module is targeted at mini-grid developers and operators at all stages of development.
- They are expected to have a basic understanding of rural, off-grid energy markets and community dynamics in developing countries.
- No specialist financing knowledge is required.
1. Financial challenges
   - Risk for investors
   - Technology challenges
   - Developer challenges

2. Financial solutions
   - Financial products and providers
   - Financial products by project size
   - Financial products by project development stage
   - Corporate vs. project financing vs. end user finance
   - Financial support schemes
   - Results-based financing
   - Strategic investors

3. Financial modelling
   - Definition
   - Why do financial modelling?
   - Structure, inputs and outputs

4. Case studies
   - Developer case studies
   - Fund case studies

Crowdfunding
Crowdfunding case study
Export credit
Loan guarantees
Investor Pitches and Request for Proposals
Financial challenges

“This year, I resolve to stay away from unnecessary risks.”

K. Spear
There are a lot of potential risks ...

- Financial challenges
- Risks for investors
  - Market / demand
  - Policy, regulation and compliance
  - Political
  - Currency
  - Force majeure
  - Land
  - Operational
  - Technical
  - Health and safety
... but two key risks stand out

<table>
<thead>
<tr>
<th>Risk</th>
<th>Description</th>
<th>Mitigation strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy / regulation / compliance</td>
<td>Lack of mini-grid regulations Licencing Cost reflective tariffs Arrival of main grid Technical regulations Fiscal policy</td>
<td>Lobbying Smaller projects may be unregulated / licence exempt Consider unregulated time and flat rate tariffs Sell services that make use of electricity, but not electricity itself Grid less likely to arrive at remote projects e.g. islands Develop grids that are technically compatible with main grid</td>
</tr>
<tr>
<td>Demand</td>
<td>Demand (revenue) does not increase as expected. Based on ability and willingness to pay Electricity generation and load profiles not aligned No long-term contracts. Monthly pre-pay is norm</td>
<td>Demand assessment Community engagement / trust Demand management Productive use support Tariff design Revenue collection / prepay End user finance</td>
</tr>
</tbody>
</table>
Technology challenges

Solar
- Day-time demand load
- Energy storage required or diesel genset for evening applications

Biomass
- Contracts for biomass (quantity, quality, price)
- Logistics costs (moving of raw biomass to site)
- Seasonality (availability of biomass throughout year)

Small hydro
- Demand forecasts - plant not scalable up or down like solar
- Lack of hydrology flow data
- Seasonality (availability of water throughout the year)
Challenges for developers

Financing challenges

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

RBF
- Mixed track record in delivering connections
- Administratively complex
- Need for bridge finance
- Limited funding available

Loans
- Small ticket size for individual mini-grids
- Risk averse banks
- Collateral requirements
- Local banks have no appetite for long-term debt (7-15 years)
- Overseas banks are concerned about business model, and currency risk
- Lack of institutional capacity
- Lack of bankable mini-grid policy and regulations

Equity
- Lack of proven, scalable business models
- Low risk-adjusted returns
- Lack of exits
- Project viability gap still supported by grants and subsidies
- Developers going into administration e.g. Solar Kiosk
### Financial products and providers

<table>
<thead>
<tr>
<th>Grants and subsidies</th>
<th>Equity</th>
<th>Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Types</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Most mini-grids rely on grants and subsidies for at least 30% of the investment costs. Grants and subsidies can be used for:  
  - Grants for feasibility studies  
  - Construction grants for capex – focus on distribution assets  
  - Results-Based Financing e.g. for new connections  
  - Promotion of productive users - technical assistance / purchases of electrical equipment | Most developers require capital from equity investors. Equity can be used for:  
  - Seed capital  
  - Expansion capital  
  - Investments in operating assets | So far very few mini-grids have secured loans. Loans can be used for:  
  - Concessional or commercial loans  
  - Green credit lines to local banks  
  - Loan refinancing facilities  
  - Loans to governments for mini-grid equipment, perhaps backed by export credit guarantees  
  - Loans to end users for electrical equipment, perhaps backed by loan guarantees |
<p>| <strong>Providers</strong>         |        |      |
| DFI, host governments, trusts and foundations, philanthropists, crowd funding | Angel investors, VC, impact investors, trusts and foundations, strategic investors, private equity, family offices, crowd funding, DFIs | DFI, banks, foundations, family offices, crowd funding |
| <strong>Route to market</strong>   |        |      |
| Public tenders, reverse auctions | Direct or indirect via funds | Direct or indirect via funds |</p>
<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>100 kW – 1 MW</td>
<td>&lt; 100 kW</td>
</tr>
<tr>
<td><strong>Main customers</strong></td>
<td>Anchor load, e.g. semi-industrial, supplying excess to state utility</td>
<td>Small businesses or anchor load</td>
<td>Households or small businesses</td>
</tr>
<tr>
<td><strong>PPA</strong></td>
<td>Yes</td>
<td>Yes/No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Payment</strong></td>
<td>Post pay</td>
<td>Post pay or pre-pay</td>
<td>Pre-pay</td>
</tr>
<tr>
<td><strong>Financial product</strong></td>
<td>Commercial equity and debt, grants for connections</td>
<td>Grants and equity required. Debt starting to be used</td>
<td>Grants and equity required. Debt starting to be used.</td>
</tr>
<tr>
<td></td>
<td>Corporate or asset finance or project finance</td>
<td>Corporate or asset finance. Project finance possible if mini-grids are clustered.</td>
<td>Corporate or asset finance. Project finance possible if mini-grids are clustered.</td>
</tr>
</tbody>
</table>
Financial products across project life cycle

<table>
<thead>
<tr>
<th>Project Milestones</th>
<th>Early Stage</th>
<th>Late Stage</th>
<th>Implementation</th>
</tr>
</thead>
</table>
|                    | • Pre-Feasibility / Feasibility study  
|                    | • Site identification / Initial community engagement  
|                    | • Demand assessment  
|                    | • Renewable resource assessed – solar, hydro, biomass, etc.  
|                    | • Technical design  
|                    | • Anchor clients or small business users identified | • Finalised business / Financial model  
|                    | • Land rights approved  
|                    | • ESIA completed  
|                    | • Water rights secured  
|                    | • Licences secured  
|                    | • Tariffs approved  
|                    | • Rules for community engagement  
|                    | • Tender for equipment supply | • EPC and O&M contracts in place  
|                    | | • Procurement & logistics completed  
|                    | | • Construction started  
|                    | | • Financing secured  
|                    | | • PPA secured  
|                    | | • Arrangements with small business users in place e.g. contracts, payment systems  
|                    | | • Mini-grids in operation and looking to expand |

| Financial Product | Grants or equity, corporate debt if strong balance sheet | Grants, equity, corporate debt if strong balance sheet, possibly concessional debt | Grants, equity or debt |
## Corporate vs. project vs. end user finance

<table>
<thead>
<tr>
<th></th>
<th>Corporate Finance</th>
<th>Project finance</th>
<th>End user finance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>Borrower = corporate developer. Investment based on historical track record of developer and income projections of portfolio</td>
<td>Borrower = project company. Investment based on income projections of individual mini-grid or group of mini-grids</td>
<td>Borrower = rural end user. Investment based on viability of end user business and available collateral. May be funded directly by developer or through local financing institution. May be in form of grant or loan</td>
</tr>
<tr>
<td><strong>Mini-grid type</strong></td>
<td>Suitable for mini-grids of Type 1, 2 and 3</td>
<td>Most suitable for Type 1 mini-grids with anchor clients that offer long-term contracted revenue streams</td>
<td>Not dependent on type of mini-grid</td>
</tr>
<tr>
<td><strong>Flexibility</strong></td>
<td>More freedom for developer on how they use funds, e.g. between different projects</td>
<td>Funds only to be used for project(s) specified in financing agreement</td>
<td>Developer or local FI determine which end users to support</td>
</tr>
<tr>
<td><strong>Financial risk</strong></td>
<td>Balance sheet impact on developer</td>
<td>Project risks shared between stakeholders</td>
<td>Potential balance sheet impact if funded through developer’s own balance sheet. Not an issue if grant-funded or financed through local FI</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>Shorter time to execute financing</td>
<td>Financing takes longer to execute</td>
<td>Relatively quick as loan amounts much smaller</td>
</tr>
<tr>
<td><strong>Complexity</strong></td>
<td>Simpler / less due diligence</td>
<td>Complex / more due diligence</td>
<td>Collateral from end user may be important.</td>
</tr>
<tr>
<td><strong>Cost</strong></td>
<td>Lower up-front costs</td>
<td>Higher up-front costs</td>
<td>Depends whether financing from developer or local FI</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td>Shorter-tenor financing (up to 5 years)</td>
<td>Longer-tenor financing (7-12 years)</td>
<td>Short term financing (usually less than a year)</td>
</tr>
</tbody>
</table>
Financial support schemes

Grant and subsidies
- Up-front payment of grants or subsidies
- Public investments, usually in mini-grid distribution assets
- Payments based on results (results-based finance or RBF)
- Competitive tenders, which include a public investment or grant element (the Pre-Developed Mini-Grid Tender)
- Tariff subsidies to bridge the viability gap
- Repayable grants which are repaid prior to distribution of dividends or sale of assets

Other support
- Concessionary loans (single digit rates if possible)
- Longer-tenor loans (to allow time for demand to build up and to match the project payback period, which may be 7-15 years)
- Local currency loans (reflecting the fact that the revenues are in local currency)
- Guarantees to de-risk projects
- Index local currency tariffs to hard currencies
Results-based financing

- Links payment of subsidies based on results
- Fixed grant per customer connected
- No upfront payment
- RBF suitable for both government and developer-initiated projects
- Developers initially have to raise their own financing
- Should make bridge financing easier because RBF grant can be used to repay loan

Please refer to Module 8 on Policy and Regulation for more information
Funding mini-grids across project life cycle

<table>
<thead>
<tr>
<th>Sources</th>
<th>Corporate Operations</th>
<th>Construction</th>
<th>Long-Term Project Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>responsAbility</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Triodos Investment Management</td>
<td>HÖEGH Capital Partners</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ENGIE powercorner</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>KAWI SAVE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt</td>
<td>responsAbility</td>
<td>responsAbility</td>
<td>responsAbility</td>
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<tr>
<td></td>
<td>ceniarth</td>
<td>ceniarth</td>
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<tr>
<td></td>
<td>REPP</td>
<td>REPP</td>
<td>REPP</td>
</tr>
</tbody>
</table>

Source: Power4All (June 2019).

Strategic investors in mini-grids (1)

Strategic investors have 3 routes to market based on risk tolerance:

- Direct investments and M&A (Mergers and Acquisitions)
- Commercial partnerships and JVs
- Indirect investments (funds and intermediaries)

Direct investments and M&A

• Commercial return expectations
• Interest in capitalising promising ventures for future investment
• Minority stake for seat on board to glean learnings
• Better valuing and sizing market opportunity
• Synergistic operational fit

Commercial partnerships and JVs

• Allow diverse array of technical partners
• Leverage internal resources like R&D, marketing etc
• Low-risk avenues to exploit operational synergies, gain learning, and leverage distribution network and on-ground market expertise of credible partners
• Many motivated by strategic plans or targets to be operating in multiple markets by 2030

Indirect investments (funds and intermediaries)
Most investments by volume are in managed funds
Benefits for strategic investors
- Vehicle for diversified co-investment with other limited partners
- Decreased diligence and direct administration needs for venture teams
- Geographically diversified risks and learnings

Process of raising funds from individuals to fund project / business
Potential source of debt, equity and donations. Almost exclusively online.

Global Crowdfunding (CF) market for energy access was $31.2m in 2018, of which 88% peer-to-peer business loans¹.

Unlike solar home systems, CF has not been used widely for mini-grids due to perceived higher risk.

Peer-to-peer CF loans not well suited for mini-grids:
• Mini-grids require long-term debt (7-15 yrs.)
• CF loans are short-term (<=7 yrs.) and have regular repayments (typically every 6 months)
• CF loans are also mainly in hard currency

CF platforms lending to mini-grid projects.
e.g. Bettervest (4 projects in Nigeria and 2 in Madagascar)
Experiments using crowdfunding for financing end-users / purchasing grid. e.g. PowerGen and Kiva
CF may be used in future for bridge funding for RBF where there is clear, short-term exit.
Crowd may in future also participate in syndicated loans arranged by others.
Crowdfunding platforms

<table>
<thead>
<tr>
<th>Reward/Donation</th>
<th>Equity</th>
<th>Debt - SMEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>GlobalGiving</td>
<td>SYNDICATE ROOM</td>
<td>lendahand</td>
</tr>
<tr>
<td>INDIEGOGO</td>
<td>SYNDICATE ROOM</td>
<td>mesofinance</td>
</tr>
<tr>
<td>COOL EFFECT™</td>
<td>Intelligent Equity</td>
<td>ENERGISE AFRICA</td>
</tr>
<tr>
<td>Kickstarter</td>
<td>FundedByMe</td>
<td>TRINE</td>
</tr>
<tr>
<td>Pozible</td>
<td>Seedrs</td>
<td>bettervest</td>
</tr>
<tr>
<td>M-Changa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1% Club</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UpEffect</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catapoolt</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>kiva</td>
</tr>
</tbody>
</table>

Debt - micro enterprises
Crowdfunding case study – Bettervest

- **Havenhill Synergy Ltd** is a Nigerian EPC contractor and developer of solar-battery mini-grids. Bettervest is a German peer-to-peer business lending platform. In 2018 Havenhill commissioned its second mini-grid project in Kwaku near Abuja. The project comprised a 41.6kWp PV generator, 178 kWh of batteries and a distribution grid of 4.6km.

- Havenhill raised a EUR 114K loan through Bettervest for the project in early 2018. The EUR 153K project was partly funded by a USADF grant ($50K).

- Havenhill attracted 233 investors in 65 days and exceeded its target (EUR 60K). Investors receive an 8.25% yield, while Havenhill pays a premium on this to cover the costs of Bettervest.


- The AfDB Green Mini-Grid Help Desk has played a key role in the development of Havenhill’s mini-grid projects since 2016, including the successful crowdfunding raise.

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*Source: Bettervest (2019)*
Export credit agencies **promote exports** for national governments

- Facilitate *competitive long-term funding*
- Provide **guarantees and insurance** to exporters and their banks *against risk of non-payment by foreign buyers*
- Best suited for **larger transactions** (>\$20 million), so unlikely to work for mini-grids unless bundled
- Some mini-grid developers / equipment suppliers planning **multi-million dollar sales of equipment to African governments**
Use export credit finance to sell mini-grid technologies to African governments and manage units on their behalf

**Main benefits**

- Exporter can secure **larger orders** and is paid like a **cash contract**
- Government buyer can **borrow for many years at very competitive fixed interest rates**
- Banks are largely shielded from political and mini-grid risks
- **Risks can be allocated** to parties that are most able to handle them

Loan guarantees

- A loan guarantee is a promise by a guarantor to a lender to **assume debt obligations of mini-grid borrower**
- A **loan portfolio guarantee** allows for multiple borrowers which can be smaller in size
- Guarantees a portfolio of loans made by a lender to a **target borrower segment** (e.g. mini-grid developers and projects) based on **pre-defined parameters** (e.g. geography, technology, business model)
- **Terms of guarantee**: portfolio limit, coverage rate, maximum loan tenor, currency and guarantee premium

Investor pitches and request for proposals (RFP)

**Investor pitch deck**
- Persuade potential investors to invest in a project/business

**RFP**
- Project funding announcement made by organisations (e.g. government agencies)
- Source of projects & funding for mini-grid developers
- outlines the bidding process & contract terms, and guides how the bid should be formatted
- used to get the lowest bid from multiple bidders

**Example pitch-deck structure:**
1. The problem
2. Your solution
3. The market opportunity
4. Business model
5. Early successes
6. Customer acquisition: marketing and sales strategy
7. Team track record
8. Budget and financial projections
9. Competitor analysis
10. Funding Needs
11. Exit Strategy
The process of creating a **summary of a company's expenses and earnings** in the form of a spreadsheet that can be used to **calculate the impact of operational decisions** (e.g. tariff choice) and other factors or events on **profitability & viability** of the mini-grid.
• Forecast the financial performance of the mini-grid
• Inputs can be adjusted to test the business’ sensitivity to different business decisions or external events
• Financial models should be designed with the objective in mind e.g internal finance purposes, external capital raising
• Benefits:
  – Provides quick answers
  – Risk assessment tool
  – Required by potential investors and other stakeholders
• Caution: Need to get input assumptions correct
Financial model structure

Usually built in spreadsheet software:
1. Input sheet with all assumptions
2. Calculation sheets for various components such as CAPEX, OPEX, loan, revenues
3. Financial statement sheet with income statement, cashflow statement, and balance sheet
4. Output sheet with key performance indicators and values coming from the financial statements
Financial model inputs

**Revenues**
- Energy consumption profile from demand assessment
- Tariff structure
- Connection fee

**Costs**
- CAPEX
- OPEX

**Macroeconomic values**
- Taxes
- Inflation
- Fees
- Interest rates

**Financial information**
- Total investment amount
- Percentage for grant, equity, and debt
- Loan terms

**Technical values**
- Uptime and energy losses

---

### INPUT

<table>
<thead>
<tr>
<th>Starting Year of the Project (Year)</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diesel Fuel [NGN/L]</td>
<td>3.5%</td>
<td>3.0%</td>
</tr>
<tr>
<td>General cost indexation (%)</td>
<td>2.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Indexation for reinvestments</td>
<td>2.0%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Exchange rate USD - NGN</td>
<td>400</td>
<td>420</td>
</tr>
</tbody>
</table>

| % | NGN/kW
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tariff 1 (1 phase users)</td>
<td>6.5%</td>
</tr>
<tr>
<td>Tariff 2 (1 phase users)</td>
<td>6.5%</td>
</tr>
<tr>
<td>1 phase users Fixed charge</td>
<td>6.5%</td>
</tr>
<tr>
<td>2 phase users Metering costs</td>
<td>6.5%</td>
</tr>
<tr>
<td>Tariff 3 (3 phase users)</td>
<td>6.5%</td>
</tr>
<tr>
<td>Tariff 4 (3 phase users)</td>
<td>6.5%</td>
</tr>
<tr>
<td>3 phase users Fixed charge</td>
<td>6.5%</td>
</tr>
<tr>
<td>3 phase users Metering costs</td>
<td>6.5%</td>
</tr>
</tbody>
</table>

**Technical**
- Technical uptime 69%
- Collection rate 99%
- Distribution Grid losses 8%
- Percentage of sales from production 50%

**Financing**

<table>
<thead>
<tr>
<th>TOTAL investment (NGN)</th>
<th>160,791,831</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grant for ASSET’S (NGN)</td>
<td>6,489,501</td>
</tr>
<tr>
<td>Grant for PROJECT DEVELOPMENT COST (NGN)</td>
<td>8,489,501</td>
</tr>
<tr>
<td>Village contribution (NGN)</td>
<td>16,979,181</td>
</tr>
<tr>
<td>Debt from investment costs (NGN)</td>
<td>55,083,454</td>
</tr>
<tr>
<td>Equity from private investment costs (NGN)</td>
<td>40,750,035</td>
</tr>
</tbody>
</table>

Example input sheet
## Financial model outputs

### Income statement
- EBITDA
- EBIT
- EBT
- Net income and cumulative net income

### Cash Flow Statement
- Cash flow and cumulative cash flow
- Free Cash Flow to the Firm (FCFF) and Free Cash Flow to Equity (FCFE)

### Balance Sheet

### Performance indicators
- Project and equity NPV
- Project and equity IRR
- DSCR
- LCOE
- Payback period

### Example output sheet

#### Financial model outputs

<table>
<thead>
<tr>
<th>Year Number</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EBITDA</strong></td>
<td>53,601</td>
<td>160,093</td>
<td>125,507</td>
<td>150,721</td>
<td>163,592</td>
<td>178,130</td>
</tr>
<tr>
<td><strong>Operating &amp; Maintenance Costs</strong></td>
<td>(146,478)</td>
<td>(172,415)</td>
<td>(154,805)</td>
<td>(238,126)</td>
<td>(182,438)</td>
<td>(218,212)</td>
</tr>
<tr>
<td><strong>Profit &amp; Loss Accounts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Depreciation</strong></td>
<td>(109,876)</td>
<td>(11,422)</td>
<td>(18,499)</td>
<td>(87,405)</td>
<td>(18,906)</td>
<td>(90,102)</td>
</tr>
<tr>
<td><strong>Interest</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>EBIT</strong></td>
<td>(109,876)</td>
<td>(11,422)</td>
<td>(18,499)</td>
<td>(87,405)</td>
<td>(18,906)</td>
<td>(90,102)</td>
</tr>
<tr>
<td><strong>Corporate tax</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total Tax</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Net Income</strong></td>
<td>(109,876)</td>
<td>(11,422)</td>
<td>(18,499)</td>
<td>(87,405)</td>
<td>(18,906)</td>
<td>(90,102)</td>
</tr>
<tr>
<td><strong>10% to MWER</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Net Income minus 10% to MWER</strong></td>
<td>(109,876)</td>
<td>(11,422)</td>
<td>(18,499)</td>
<td>(87,405)</td>
<td>(18,906)</td>
<td>(90,102)</td>
</tr>
<tr>
<td><strong>Cumulative Net Income</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Cash Flow

<table>
<thead>
<tr>
<th>Year Number</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenues</strong></td>
<td>53,601</td>
<td>160,093</td>
<td>125,507</td>
<td>150,721</td>
<td>163,592</td>
<td>178,130</td>
</tr>
<tr>
<td><strong>Operating &amp; Maintenance Costs</strong></td>
<td>(146,478)</td>
<td>(172,415)</td>
<td>(154,805)</td>
<td>(238,126)</td>
<td>(182,438)</td>
<td>(218,212)</td>
</tr>
<tr>
<td><strong>Tax</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Working Capital</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Operating Cashflow</strong></td>
<td>(109,876)</td>
<td>(11,422)</td>
<td>(18,499)</td>
<td>(87,405)</td>
<td>(18,906)</td>
<td>(90,102)</td>
</tr>
<tr>
<td><strong>CAPEX incl. extension</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Investing Cashflow</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Kalangala Infrastructure Services (KIS) is a $49m mixed utility in Uganda which includes a ferry service, a trunk road, an energy project and a water supply system. The company, which is located on Bugala Island on Lake Victoria in Kalangala District, has a 1.6-MW solar diesel power system that cost about $16m.

The multi-utility model played a key part in the successful financing of KIS. The project’s backers took comfort from the revenues generated by the long-term government contracts for the ferries and the road and therefore were able to accommodate the revenue and demand uncertainty around the power business.

KIS used a mixture of equity from DFIs, and DFI and commercial debt backed by guarantees. It also received an output-based grant to subsidise connections. Debt financing was provided by Emerging Africa Infrastructure Fund (a DFI) and Nedbank Capital (a commercial bank). Joint debt guarantees were provided by GuarantCo and USAID.
Ruaha – small IPP/mini-grid case study

- Ruaha Energy is a Tanzanian private developer and **operator of rural and small urban electrification projects**, including village mini-grids (solar PV with biomass gasifiers), grid-tied solar PV, and small hydro plants.

- Ruaha has installed one 50-kWp mini-grid serving the village of Zombo and two nearby villages. Ruaha is developing several grid-connected projects, including two 1-MW solar PV plants and two small hydro plants (500 kW and 200 kW).

- Ruaha has raised **corporate equity** for the village mini-grids and on-grid projects, and secured grants for individual projects. In November 2016, it raised funds from a **U.S. equity private placement** and now is planning to raise more funds through debt and equity private placements or possibly equity crowdfunding.

- Ruaha has been awarded five **project grants for technical assistance and capex** and it is hopeful that it will secure additional grants soon.
JUMEME is a developer of mini-grids in Tanzania majority owned by RP Global. Other shareholders include INENSUS, Terra Projects and St Augustine University.

JUMEME has 12 active solar diesel hybrid mini-grids on islands in Lake Victoria, Tanzania, serving close to 5,000 connections total. JUMEME currently has a further 15 mini-grids under development, which will connect an additional 6,000 customers by Q2 2020.

JUMEME has raised around $16.5M to fund its mini-grid projects, of which approx. $5M equity (including sale of strategic stake to RP Global) and $11.5M grants (ACP-EU Grant of $8M, Tanzania REA RBF of $2.4M, EEP $500k and SEFA $400k, among others).

JUMEME has developed KeyMaker Model to improve processing of local resources.
Developer case study – PowerGen

- Founded in 2011, PowerGen Renewable Energy is a leading micro-utility company in Africa with over 40 mini-grids and hundreds of off-grid, renewable energy systems installed across 7 countries in Sub-Saharan Africa. They have made over 50,000 connections through mini-grids. Last year they took over the mini-grid business of Rafiki / EON Offgrid Solutions.

- They have publicly announced $6.7M of financing until year-end 2018, of which $4.5M equity and $2.2M larger grants (two from US Aid and one RBF from the GMG Facility Kenya). They have also received smaller grants from other sources.

- The Series A equity round was led by DOB Equity (Dutch family office), with other investors including AHL Venture Partners (impact venture capital), and private investors including two high net worth individuals*.

- PowerGen recently announced an investment by Crossboundary Energy Access in their Tanzanian projects (see next slide).

* Marc Beuls, former President and CEO of Millicom International Cellular and Billy Harbert, CEO of BLHarbert International
Fund case study – CBEA (1)

- CrossBoundary Energy Access (CBEA) is the first blended project finance facility for mini-grids in Africa

- CBEA is part of the CrossBoundary Group, a set of platforms focused on bringing private capital into underserved markets

- CBEA is initially investing $16 million into mini-grids providing grid-quality power to 170,000 people

- Funding came from Rockefeller Foundation and Ceniarth, while the set up costs were funded by UK aid and Shell Foundation

Powergen Tanzania*

- CBEA’s first investment is an initial $5.5 million to finance 60 new pay-as-you-go rural mini-grids of Powergen, providing grid-quality power to 34,000 people in rural Tanzania

- CBEA has signed $3 million results-based long-term senior loan with REPP (see other case study)

CBEA overcomes challenge of financing small individual mini-grids and makes long-term financing easier for developers

CBEA’s strategy is to align its interests with those of the developer

- CBEA sets up SPV to purchase projects 100% from developers once operational
- Very attractive for developers because they can recycle cash from operating projects to fund future growth
- CBEA pays developers a development premium based on share of future profits from the portfolio
- Make developers responsible for long-term customer and asset management services
- CBEA pays developers operating fee with performance bonus when mini-grid revenues exceed projections

Fund case study – REPP

- Renewable Energy Performance Platform (REPP) is UK government-backed funding platform managed by Camco Clean Energy, focused on helping renewable projects attract private and institutional investment

- Products
  - Development capital – loans for third party development expenses
  - Gap financing – bring projects to financial close using different financial instruments, including results-based loans for mini-grid rollout. Funds disbursed based on meeting results and performance indicators
  - Access to risk mitigation instruments
  - Access to long-term lending

Mini-grid investments*

- CBEA Powergen Tanzania – $3 million results-based senior loan (2019)
- Arc Power Rwanda – initial £600K convertible loan (2019)
- Virunga Power Corporate - $2.5 million convertible loan (2018)
- Powerhive Kenya – $3 million results-based loan with convertible option (2018)

*See REPP (2019) in biography
Financing is a major challenge for mini-grids due to the lack of proven business models and the high level of risks, particularly in relation to electricity demand and policy and regulation.

Mini-grids are still heavily reliant on grant and equity funding, although corporate/project lending is increasing.

Financial support from the public sector remains critical. Examples include government tenders and support programmes and investment funds whose anchor investors include development financing institutions.

Strategic investors from the utility, oil & gas and other sectors have invested in mini-grids, both directly and through funds.

Innovative funding and de-risking structures have emerged including results-based financing, crowd funding, export credit and loan guarantees.

Developers have adopted different funding models including the multi-utility model and the small IPP / mini-grid co-financing model.

For developers seeking funding, it is important to develop robust financial models that can be tested for different business scenarios. As with any financial model, it is important to identify the right inputs in order to generate realistic results.
Further Reading


Further Reading


Further Reading


