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RENOVÁVEIS NA  
ELECTRIFICAÇÃO  
DE MOÇAMBIQUE

ALER CONFERENCE  
RENEWABLES IN THE  
ELECTRIFICATION OF MOZAMBIQUE

# Private Sector Participation in the Off-grid Market

## Is the Mozambican Renewable Energy Sector Bankable?



**Emmett Costel**  
Epsilon Energia Solar  
Director of Operations



**EPSILON**  
**ENERGIA SOLAR**

Epsilon Energia Solar (EES), is a company that distributes and finances pico solar systems in rural Mozambique.

The business model combines last mile distribution, connected equipment, mobile money and effective credit management to deliver a Pay As You Go service to bottom of the pyramid households.

The venture is backed by respected local investors Epsilon Investimentos, Mozambique's largest domestic NGO, FDC led by Graca Machel, and Kevin Kennedy, an experienced PAYGO investor and manager.

# Renewable Energy in Mozambique

## - a word from Minister Klemens

*The Mozambican Minister for Mineral Resources and Energy, Leticia Klemens at the Seventh session of the General Assembly of the International Renewable Energy Agency (IRENA) – 14<sup>TH</sup> of January, 2017*

“Under the Renewable Energy Development Policy, we want to increase the number of renewable energy projects in the country, and for this we have national and foreign investment, so you are invited to move forward with proposals for our country.”

### Key Takeaways:

- Mozambique has enormous potential in terms of renewable energy - Renewable Energy Atlas.
- Seeking to attract more investment in renewable energies to Mozambique
- It is the Mozambique government’s aim to ensure policies contribute to the sustainable development of the national energy sector.

### Main challenges identified:

- The need to adjust the political, strategic and regulatory framework in order to attract more investors
- Deepening the integration of renewable energies into the national electricity system and
- The development of isolated systems models based on renewable energy systems.

# Energy Access in Mozambique I.

- Urban electricity access rate is estimated at 67%
- Rural electricity access is estimated at 27%
- Overall electricity access rates standing at 39-40%
- Addressable Market: At least 18 million rural Mozambicans are without access to grid electricity.
- Off-grid potential: 5M Households x 200W = 1GW
- Peak demand in 2015 was estimated at 831 MW. Of peak capacity demanded from EdM and 950 MW directly procured from ESKOM by MOZAL, leading to 1,781 MW of peak demand.

# Energy Access in Mozambique II.

The Ministry of Mineral Resources and Energy (MIREME) has made electricity access a priority. The draft Energy Strategy 2014–2023 sets out an ambitious target of 50% grid connection by 2023.

Currently, EdM is only connecting half the number of households per year required to meet this target.

Even with government and donor support, the financing gap to meet EdM's investment needs (\$2.2b from 2016 to 2019 ) is too large.

Grid expansion puts a drain EdM's resources. Given the highly dispersed nature of much of Mozambique's rural population, the distribution costs of providing the grid to all are prohibitive.

The cost of a grid connection: \$500 - \$2000

Even in urban areas, EDM has found that heavily subsidised grid-connection fees of \$120 and \$70, for 'ordinary' and 'social' customers respectively, are not always affordable and act as a barrier to new grid-connections.

As per a 2015 World Bank Policy Note, the power sector in Mozambique faces three key challenges:

- to provide reliable and efficient electricity supply;
- need to expand its generation and transmission capacity to meet current and future demand;
- to provide access to electricity to the vast majority of the population.

# DFID's Energy Compact

Priority Policy Area	Current Policy Issues	Action Required
<b>1. Policy Framework</b>	<ul style="list-style-type: none"> <li>• No off-grid policy in place.</li> <li>• Weak coordination between government institutions.</li> <li>• Unclear division of roles and responsibilities among GoM institutions (e.g. MIREME, MITADER, EDM, FUNAE).</li> </ul>	<ul style="list-style-type: none"> <li>• Define off-grid policy, integrate into National Electrification Strategy and National Electrification Plan.</li> <li>• Strengthen institutional framework; improve coordination within GoM.</li> <li>• Assist GoM with restructuring/defining mandates.</li> </ul>
<b>2. Supply Chain Financing</b>	<ul style="list-style-type: none"> <li>• Local access to corporate finance (e.g. working capital) is difficult.</li> <li>• Import of FOREX cumbersome.</li> <li>• Difficulties in exporting of capital.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish dedicated credit lines with special interest rates for off-grid RE.</li> <li>• Reduce administrative burden for importing capital.</li> <li>• Facilitate repatriation of capital.</li> </ul>
<b>3. Fiscal and Import Regulation</b>	<ul style="list-style-type: none"> <li>• High level of VAT and import duties apply.</li> <li>• Duties often not applied uniformly.</li> <li>• Application / licensing procedures for new companies/branches not uniformly applied.</li> </ul>	<ul style="list-style-type: none"> <li>• Apply (temporary) duty/VAT reductions or exemptions on (certified) solar products/appliances.</li> <li>• Simplify/streamline taxing procedures; assist GoM in uniformly applying procedures.</li> <li>• Simplify/streamline application / licensing procedures.</li> </ul>

# DFID's Energy Compact II.

Priority Policy Area	Current Policy Issues	Action Required
4. Quality Standards	<ul style="list-style-type: none"> <li>• There are no quality standards being in force at the moment.</li> <li>• Potential for influx of inferior quality, undermining solar market for quality products.</li> <li>• Available but limited in-house technical capacity.</li> </ul>	<ul style="list-style-type: none"> <li>• Consider (voluntary) national or international quality standards in place</li> <li>• Favour import of products adhering to quality standards - in combination with awareness raising.</li> <li>• Engage and build capacity on testing and compliance by IIM / UEM solar labs.</li> </ul>
5. Mobile Payment Mechanisms	<ul style="list-style-type: none"> <li>• Lack of financial literacy and knowledge among potential consumers</li> <li>• Low distribution of Mobile money agents in rural areas</li> </ul>	<ul style="list-style-type: none"> <li>• Develop tailored agent training programmes and financial education and protection programs for consumers.</li> <li>• Support and incentivise expansion of MM agents in rural areas.</li> </ul>
6. Awareness Raising	<ul style="list-style-type: none"> <li>• There is limited awareness on solar use, quality, maintenance among potential consumers.</li> <li>• There is limited awareness among GoM institutions on solar and the legal, fiscal, financial impediments that exist.</li> </ul>	<ul style="list-style-type: none"> <li>• FUNAE (in coordination with private sector) to set out awareness raising strategy among potential consumers.</li> <li>• FUNAE (possibly in coordination with donors) to implement awareness raising among relevant ministries and institutions within GoM.</li> </ul>

# Private Sector Considerations I.

Foreign companies do not consider Mozambique an easy country in which to start an off-grid energy business.

Despite the opportunities presented by an addressable market, the Mozambican off-grid market remains of limited size, because the prevailing business environment raises the risk profile of investing in the sector significantly.

DFID's - Business Environment for Renewable Energy in Mozambique 2017 cites that there are a number of barriers to the Mozambican market that individual companies cannot affect themselves. The principal barriers identified include:

- Inability of companies to access (commercial) finance;
- High tariffs and government fees for imported goods;
- Parallel Systems/Multiple Overlapping Procedures/Absent or obstructive policy and regulations;
- Current regulations governing companies generating and selling energy across public (i.e. property) boundaries.
- Tariffs and the ability to set them at cost-recovery.
- Low levels of supporting services (mobile money, delivery logistics, etc.).

Mkopa Market Assessment identified three main challenges:

- Pricing – ability to pay
- Logistics/supply chain
- Mobile money uptake



# Private Sector Considerations II.



FIRM

**A. Lack of capital:** access to affordable finance (short and medium term) for setup, inventory and working capital.

**B. Weak business knowledge and business models<sup>i</sup>:** lack of Mozambican awareness and market knowledge, lack of proven commercial business models in Mozambique for larger scale renewable energy solutions.

**C. Business capacity<sup>i</sup>:** lack of skills including on how to prepare projects



VALUE  
CHAIN

**D. Lack of mobile money:** limited mobile phone coverage and mobile money take-up in rural areas, which is crucial to affordability through PAYG systems.

**E. Limited logistics:** lack of infrastructure, logistics and supply chain partners makes delivery and supply of goods challenging and/or expensive.



USER

**F. Low customer demand:** including lack of awareness and low rural purchasing power with rural poor spending in the region of only \$100 per year on energy and phone charging.



GOV

**G. Inadequate regulation/policies<sup>i</sup>:** fiscal barriers include import costs estimated as high as 30-40%<sup>ii</sup>. GMG tariff setting and laws prevent companies from generating and selling energy across property boundaries.

# Regulatory Framework for Electricity Supply & Investment I.

- Electricity Law & Regulations
  - MIREME/DNE/DNER/ARENE/Local Authorities
- PPP & Mega-Projects Law and Regulations
  - MIREME/MEF/Council of Ministers
- Investment Law & Regulations
  - APIEX(CPI)/MIREME/MEF/Council of Ministers
- Government Procurement Regulations

# Regulatory Framework for Electricity Supply & Investment II.

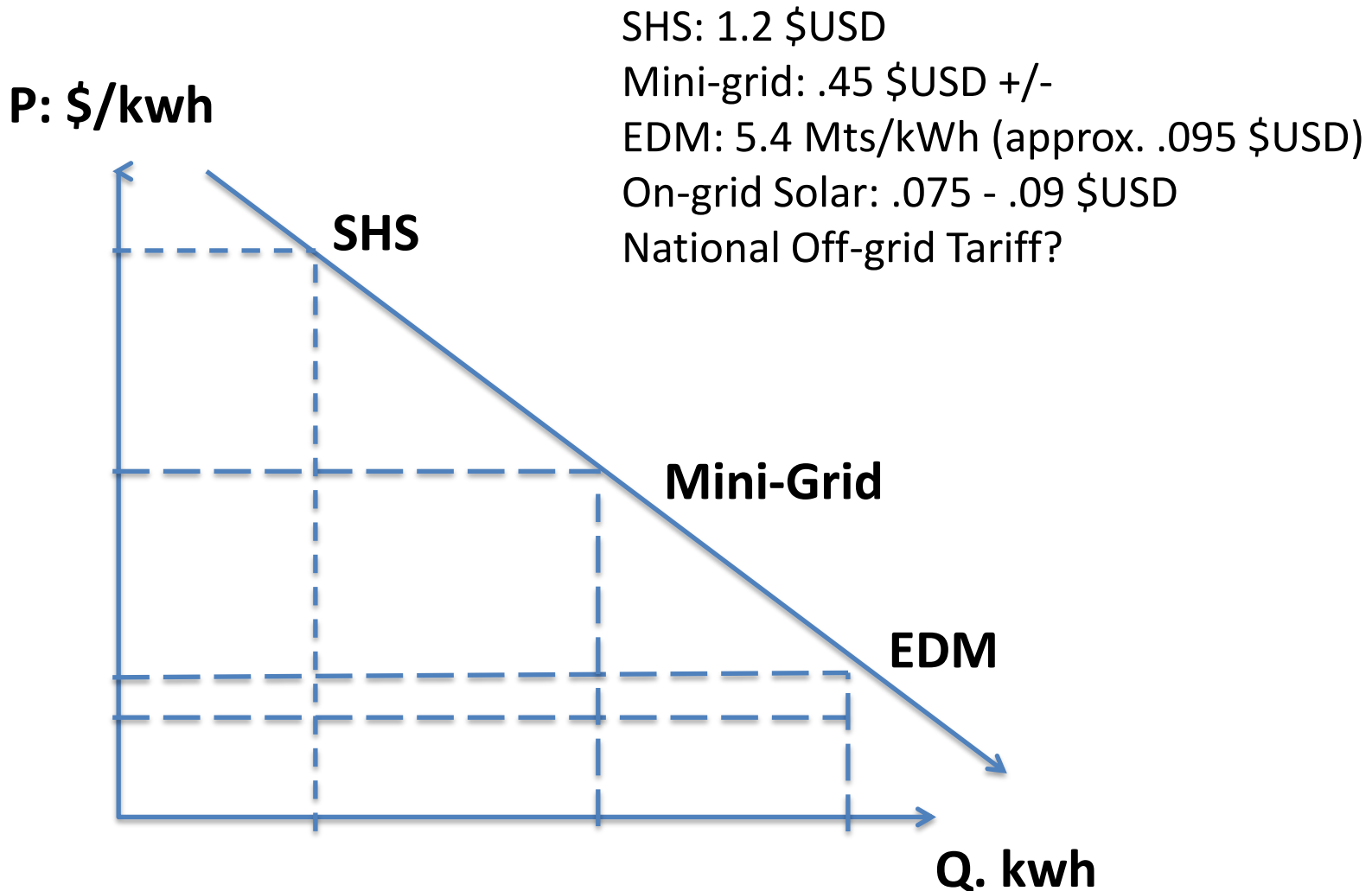
1. Apply for Concession - MIREME
2. Authorisation to conduct feasibility studies & guarantee to obtain concession
3. Investment Authorisation Application - APIEX
4. EIA - MITADER
5. DUAT
6. PPP Megaprojects Tender compliance or exemption
7. Structure of IPP Concessionaire (with Govt participation)
8. Grid/Off-grid Tariff Approval (MIREME, MEF, ARENE, EdM)
9. Administrative Law Tribunal Review and Approval
10. Establishment Licence (MIREME & EdM)
11. Construction Licence (MPWA)
12. Exploration Licence (MIREME & EdM)

# Financing & Investing

- Hedging against foreign exchange rate volatility
- Cost of Local / Domestic capital
  - Private equity (30%)
  - Commercial credit (min is 26.5%)
- Public sector subsidy
  - bilateral partners and development funds
  - patient capital
  - government subsidy / fiscal incentives
- Fiscal Incentives & Import duties

Import Taxation	Low	High
Duties	7.5%	20%
VAT	17.0%	17%
Mcnet	0.85%	.85%
Total Burden	26.625%	41.59%

# Levelised Cost of Energy



# Ability to pay

What do Mozambicans spend and how much money is in the rural economy?

GreenLight (2016) undertook a demand assessment for M-Kopa in the communities of Lizuveve, Muchia and Nhoqueiro near Moamba, in the Southern Part of Mozambique.

Key Findings:

- 65 per cent of rural households make use of battery-operated torches for lighting, with monthly spend of MZN 221.
- 43 percent of the households surveyed in the GreenLight study earn below MZN 5,000 per month (USD \$65 at the exchange rate of 13 October 2016).
- Kerosene is not widely used for lighting purposes.
- Cell-phone charging - It would appear that many households charge their phone for free.
- Monthly Spend for energy? \$USD 5 - 10

# Bankable Business Models?

## Solar Home Systems

- AIPU vs ARPU – cost of sales / cost of goods / customer acquisition
- Consumer Finance - PAYG, MPESA - Ability to pay vs willingness to pay

## Mini-grids

- Regulatory Framework
- No proven business case for Private Equity ROI's – must be considered an infrastructure investment @ 7-10 years at <10%

## Captive Power

- Bankable Private Sector Off-takers

## On-Grid

- Domestic off-take: What PPA's have been signed with EDM? Is EDM bankable?
- Exporting power - Mozambique's excess power generation is exported to the Southern African Power Pool (SAPP). N.B. SAPP as an off-taker is somewhat limited. What is the transmission capacity?
- There is a degree of government clarity on geographical grid-expansion plans.
- REFIT – being reassessed. Feed in requirements: 10 MW at 10KM

# There are a growing number of Private Sector Initiatives

- DESCO's
  - SolarWorks
  - RVE.SOL
  - A growing number of different operators
- Mini-grids
  - Titimane
  - Porto Henriques: FUNAE, RVE.SOL & Mocitaly
- On-grid
  - Scatec 40MW
  - Neon 2 x 40MW
  - Eleqtra, Pavué (Hydro)
  - Namaacha (Wind)





# AMER

Associação Moçambicana  
de Energias Renováveis



**RECP**  
Africa-EU Renewable Energy  
Cooperation Programme



**ALER** Associação  
Lusófona  
de Energias  
Renováveis

# Opportunities

- DFID's BRILHO Program
- AFDB's SEFA financing: IPP, PPA, REFIT
- PROLER – RE On-grid Auction
- 250 MW @ 10 MW min projects
- Rural Electrification Study
- KfW's Credit Line for Renewable Energy
- Get FiT
- Mini Grid Regulatory Framework
- FUNAE's project portfolio
- CNELEC – ARENE: regulatory body
- PPA Structure – precedence established by Scatec Solar



**EPSILON**  
**ENERGIA SOLAR**

# Why SHS-PAYG?

- The main opportunity lies in the size of the addressable market. With low grid access and unreliability of electricity supply, PAYG Solar products have the potential to satisfy large numbers of people.
- Proving the rural market is bankable.
- Credit profiling is borne of the synergies between energy access and access finance / financial inclusion.
- We are a technology and financial services business. We aren't building a solar company so much as we are building a financial institution providing asset financing solutions.

