



Mozambique – Off-grid Energy Market Assessment

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COUNTRY AND ENERGY SECTOR CONTEXT

Mozambique Context

- ❖ Population of 28.9 million people.
- ❖ Land area of 801,590 square kilometres, 2,500 km coastline.
- ❖ Rural population of 67%, and average household size 5 persons.
- ❖ Mainly agricultural production and fishing in rural areas.



Electricity Sector

- ❖ National grid, distributed by Electricidade de Moçambique (EDM), covers just over 30% of the population, of which 57% is urban coverage and only **15% is rural coverage**. Over 4.2 million households do not have access to the grid.
- ❖ The National Electrification Strategy (NES) projects that 50% of households will have access to the grid by 2030. The rest of the population is a potential market for off-grid technology.
- ❖ The Mozambique Energy Fund (FUNAE) has contributed to off-grid energy access with over 1,767 projects over the last 20 years.



Biomass Energy Sector

- ❖ People rely on charcoal for cooking in provincial capitals and large towns (over 80%), and on wood in rural areas (over 95%). The use of inefficient cookstoves increases consumption of biomass.
- ❖ Whilst most people collect wood for free in rural areas, the price of charcoal has been steadily increasing in recent years.
- ❖ The production of charcoal is one of the leading contributors to deforestation in Mozambique. Forest cover is reducing at alarming rates (e.g. 400 ha/annum just to supply Maputo with charcoal)
- ❖ Traditional biomass is also associated with health problems from indoor air pollution and ‘time poverty’ from firewood collection. Women are disproportionately affected.

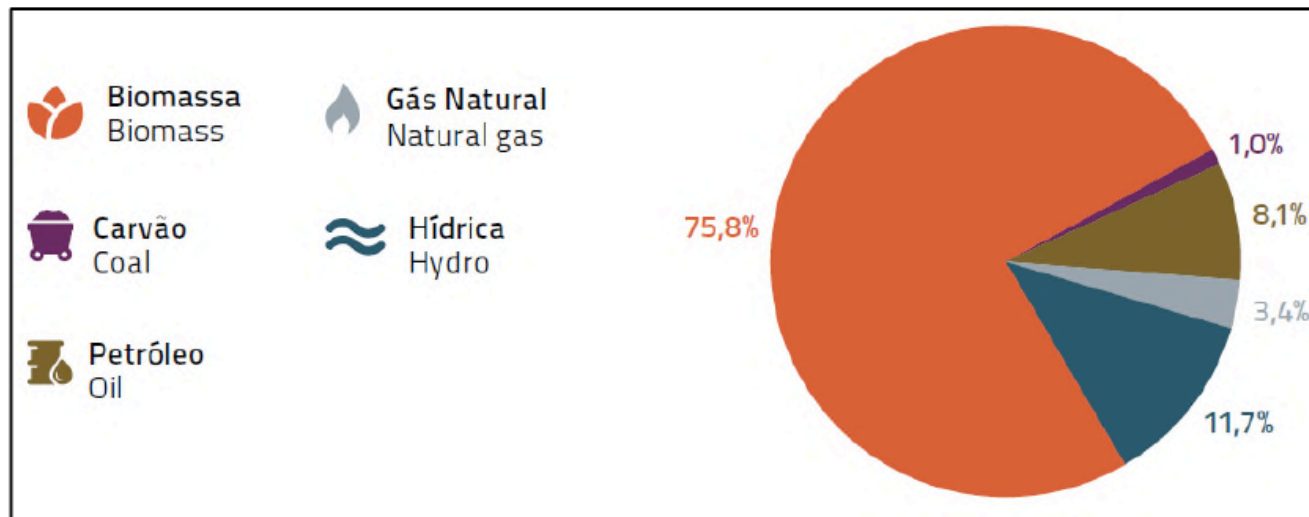


Figure: Share of total primary energy supply by source (dominated by biomass due to cooking energy)

MARKET ASSESSMENTS

Market assessment: Off-grid solar

- The potential addressable market for Solar Home Systems (SHS) has been estimated at 4.4 million households.
- Significant potential for solar ‘productive use’ technologies such as water pumps and grain mills.
- +/- 20 companies are currently selling certified SHS, with 4 offering PAYGo models.
- NGOs and FUNAE have played a role in distribution of solar systems.
- Low cost but low quality solar equipment is widely available in informal markets. Faulty equipment may damage consumer trust.

Cost, affordability and projected addressable market size of SHS		
System	Affordability (households)	Projected national market size
Single light and phone charger	86-94%	4.4 million
Multiple lights, phone charger, radio	72-87%	3.5 million
Multiple lights, phone charger, radio, TV	12-22%	645,000
Multiple lights, phone charger, radio, TV, refrigerator	6-11%	276,000

Source: Greenlight and Economic Consulting Associates, 2018

Market assessment: Mini-Grids

- African Development Bank estimates mini-grids could connect 22% of households – or 5.6 million citizens.
- FUNAE has launched a portfolio of 675 Mini-Grid sites and conducted pre-feasibility studies on 30 off-grid communities in the hope to attract private investors.
- Mini-grids were implemented directly by FUNAE in the past, but are now opening up to private sector developers through a PPP model.
- Barriers include low rural population density and reluctance to pay more than the national tariff.

Market assessment: ICS and clean fuels

- World Bank estimates 4% of Mozambicans have access to clean cooking technologies and fuels (compared to a global average of 60%)
- Potential demand for improved cooking stoves (ICS) estimated at 1.2 million stoves in urban areas and 3.2 million stoves in rural areas.
- Clean cooking fuels include ethanol, sustainable charcoal and briquettes, pellets, bio-gas and LPG.
- Issues:
 - In rural areas, replacing firewood collection with cleaner cooking frees up time but not financial resources
 - Supply chain and distribution challenges
 - Need to adapt products on offer to user preference and cultural practice.

CROSS-CUTTING ISSUES AND CHALLENGES

Ability to pay

- Rural incomes are extremely low – this is a key barrier to ability to pay for modern energy services.
- 72% of rural Mozambicans live below the international poverty line of \$1.90 per day.
- Off-grid energy can replace current household spending on batteries, candles, kerosene, phone charging, etc.

Monthly spending – rural households

Total monthly spending	3709 MZN	
Cooking fuel	224 MZN	6%
Lighting	292 MZN	7%
Charging phones	190 MZN	5%
Batteries	284 MZN	5%
<i>Total energy expenditure</i>	<i>937 MZN</i>	<i>24%</i>

Access to finance and mobile money

- Access to finance is a challenge for both businesses and end consumers.
- Bank lending rates are high (25+%) and collateral requirements are a barrier to borrowing.
- Financial institutions often have low familiarity with renewable energy.
- 77% of rural adults in Mozambique are financially excluded (i.e. do not use any financial products).
- 22% of Mozambican adults accessed mobile money in 2017 – compared to 73% of Kenyans, 39% of Tanzanians, 49% of Zimbabweans and 28% of Zambians.

Business environment

Regulatory challenges

- High and inconsistent import duties (between 7.5 and 20%) and VAT (17%) which results in a higher price for end-user
- Lack of specific regulatory regime for off-grid energy (particularly mini-grids)
- No specific fiscal incentives

Business environment challenges

- Limited logistical infrastructure (roads, ports)
- Highly dispersed rural population
- Access to business services

EMERGING CONCLUSIONS

Emerging conclusions

- There is a large potential customer base for off-grid energy services that is currently under-served.
- All three sectors reviewed – off-grid solar, mini-grids and improved cookstoves / clean cooking fuels – have the potential for significant market growth.
- Business models will need to be tailored to the needs of rural consumers, and take into account limited disposable incomes.
- Businesses face barriers including poor distribution infrastructure, regulatory complexity, and high import costs.
- Targeted financing for market creation and scale up does not remove these obstacles, but may help businesses to be better able to overcome them.

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