



## Lessons from EEP Supported Projects

# Analysis of Solar PV business models in East Africa

The 4<sup>th</sup> Knowledge Exchange Forum,  
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## Business models




Most solar PV projects implement one of 5 business/delivery models:

-  Retail/Over the Counter
-  PAYG consumer financing
-  Traditional consumer financing (via FIs)
-  Mini/micro-grid
-  Fee-for-service










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## Market Segments

Multi-tier Framework (modified <sup>‡</sup> )	Power capacity	Tier criteria
Tier 0.5 <sup>‡</sup>	~ 0.5Wp	Task lighting ONLY
Tier 1	3Wp	Task lighting AND Phone charging
Tier 1.5 <sup>‡</sup>	~ 8 - 15Wp	General lighting AND Phone Charging
Tier 2	~ 30 - 50Wp	General lighting AND Phone Charging AND Television
Tier 2.5 <sup>‡</sup>	~ 80 - 200Wp	Tier 2 AND Any medium-power appliances
Tier 3	up to 600Wp	Medium-power productive use/income generation appliances

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- ## Retail / over the counter sales
-  A large country wide network of distributors and retailers required
  -  Transactions are mostly cash based.
  -  Most common delivery model for Tier 0.5 (task lighting) and Tier 1.5 (task lighting and phone charging)
  -  Proven to be an especially effective model for the Tier 0.5 market segment (\$ 6-10 price range)
  -  Intense below the line marketing (face-to-face) required at initial introduction
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## Retail / over the counter sales



- Marketing activities typically at central gatherings
- At \$ 6-10 product price, difficult to have purely commission based sales agents
- After an optimum volume and spread of sales, and a positive customer experience, word of mouth takes over. Customers then actively look for the product at retail and distributor outlets
- Product quality and timely honoring of warranty claims is necessary to build this positive experience
- Counterfeit products and poor quality products are key market challenges



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## PAYG Consumer Financing Model



- Supplier of the solar product also provides consumer finance
- Effectiveness of model is dependent on the repayment fee charged i.e. the extent to which this fee matches the disposable income of the target market segment (the lower the fee, the larger the potential market)
- This model also seeks to reduce the entry barrier by reducing the amount of deposit required
- As systems are in the \$ 150 – 1,000 range, decent commission payments can be made to sales personnel









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## PAYG Consumer Financing Model



-  **Most common delivery model for:**
  -  Tier 1.5 (~ 8 – 15  $W_p$ , General lighting and phone charging)
  -  Tier 2 (~ 30 – 50  $W_p$ , General lighting, phone charging & TV)
  -  Tier 2.5 (~ 80 – 200  $W_p$ , Tier 2 and any medium-power appliances)
-  Demonstrated the greatest success with Tier 1.5 where repayment fees are in the range of \$ 0.50/day
-  For Tiers 2 and 2.5, repayment fees are in \$ 0.80 – 1.20/day range






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## PAYG Consumer Financing Model



-  In addition to marketing at central gatherings, supplementary door-to-door marketing is required.
-  For smaller PAYG systems, the cost of repossession can be significant and it may not be possible to resell / reuse the system
-  The PAYG model creates a significant cash flow burden on the business. The more expensive the system and the longer the repayment period, the greater the cash flow burden



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## Consumer Financing (FI Partner) Model



- Partnership between PV supplier and Financial Institution:
  - PV supplier provides products and associated services
  - FI provides consumer financing and collects repayments
- Addresses cash flow burden of PAYG as supplier is paid by the FI upon delivery & installation
- Default risk lower than for PAYG as FIs experienced in vetting applicants and using different types of collateral instruments
- FIs can offer financing at lower interest rates than PAYG companies



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## Consumer Financing (FI Partner) Model



- Marketing costs low compared to other models
- Model previously been tried in EA with little success. However, with standardized high quality plug and play solar PV systems, and larger dedicated solar PV companies, the potential is being re-explored
- Model suited for
  - Tier 2 (~ 30 – 50 W<sub>p</sub>, General lighting, phone charging & TV)
  - Tier 2.5 (~ 80 – 200W<sub>p</sub>, Tier 2 and medium-power appliances)
- Traditional consumer financing potentially more effective than PAYG when repayment fees > \$ 0.50/day and repayment durations > 18 months






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## Mini/Micro-grid Model



-  In Eastern Africa, private solar mini/micro-grids typically serve 20 – 400 customers
-  Technically most effective when a large number of customers can be connected within a 600 m radius
-  Electricity tariffs typically designed to recover capex. Different strategies are used, but ideally a fixed cost should be charged to all consumers to recover capex.





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## Mini/Micro-grid Model



-  In most grids deployed in EA, average revenue per user (ARPU) often in the \$ 3-5/month range. The ARPU is brought down by a high % of small, inconsistent or dormant users.
-  Pay back periods for mini/micro grids are long, 3 – 7 years (with AC grids having longer pay back periods than DC grids) → difficult for developers to mobilize commercial finance



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## Fee for Service Model



- Similar to a mini/micro-grid system, but electricity services provided through stand-alone systems as opposed to a distribution network
- Model well suited to provide electricity to dispersed communities, where large distances between customers make mini/micro-grids unviable
- Ownership of the systems is not transferred to the customer and the business/project is entirely responsible for maintenance and replacement of the systems



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## Fee for Service Model




- Significant upfront cost has to be borne by the developer → payback periods are long. Not yet implemented in EA as fully commercial model
- To be sustainable, the model requires large clusters of customers in a given area of operation
- The model is suited for:
  - Low income customers i.e. those for whom a Tier 0.5 - 1 service level would suffice but cannot afford the \$ 6-10 required to purchase a task light
  - Provision of micro-grid like services (Tier 2.5 - 3) in areas where customers are too sparsely populated



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### Model Comparison - Pricing

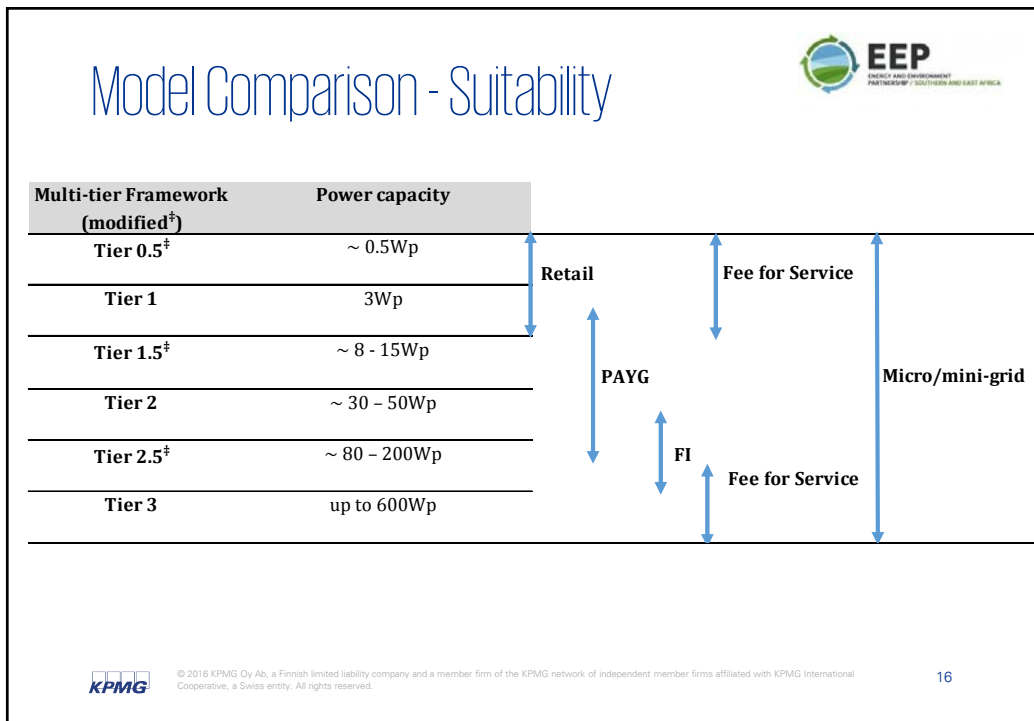


Multi-tier Framework (modified <sup>†</sup> )	Power capacity	Delivery Model	Connection/Joining fee, Deposit or Price	Monthly cost
				3.5\$
Tier 0.5 <sup>‡</sup>	~ 0.5 W <sub>p</sub>	Retail	6 - 10\$	-
		Fee for Service	0 - 1.2\$	0.3\$
Tier 1	3 W <sub>p</sub>	Retail	30 - 60\$	-
Tier 1.5 <sup>‡</sup>	~ 8 - 15 W <sub>p</sub>	PAYG	25 - 40\$	15\$
Tier 2	~ 30 - 50 W <sub>p</sub>	PAYG	40 - 80\$	18 - 40\$
		FI		25 - 30\$
Tier 2.5 <sup>‡</sup>	~ 80 - 200 W <sub>p</sub>	PAYG	20 - 40\$	30 - 40\$
		Fee for Service	50 - 80\$	7 - 14\$
Tier 3	up to 600 W <sub>p</sub>	Fee for Service	90\$	18 - 20\$
				30\$/m
				20\$

↑ Mini/micro - grid





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## Discussion points



-  Employment creation – skills required
-  Policy issues – clear consistent framework required



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