Promoting Energy Access for the Urban Poor in Africa: Approaches and Challenges in Slum electrification

ENERGY DEMAND CHALLENGE IN SLUM ELECTRIFICATION

(A Case of Kibera Slum Electrification Project, Nairobi)

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Kibera Slum Electrification Project Statistical Data

- Population: About 750,000
- Area Coverage: 6km x 1km
- Electrifiable households :300,000
- Billing: 2.1 Gwhrs against 5.2Gwhrs (restricted load)
- Revenues: Ksh 2m (USD 25,000) against expected Ksh 5m (US\$ 62,500)
- Pilot 2006 at Ksh 3.3m (USD 41,250) with first connection in March 2007
- Phase 1&2 at Ksh 34.4m (USD 403,000) targeting 11,000 customers
- First 100 customers free internal wiring done with ready boards at Ksh 8m. Response still slow.
- Only 3,367 out of identified 44,000 paid with 2,611 connected.

Household Load Mapping Model

- Existing 5 no 315 KVA transformers at peripheral estates to central metering points inside slum.
- Load details per plot: assumed homogeneity in loads at 14 lighting points and 7 socket outlets with diversity of 0.6
- Load mapping done assuming standard loading per plot
- Load limiters installed to restrict loads and transformers fused appropriately.
- High plot density restricted each transformer coverage to a radius of 300 m.

Load Mapping Of Kibera



Load Survey Questionnaire

APPLICANT DETAILS

NAME OF TENANT	CHARLES MUIRUR NAUGUNA
NAME OF LANDLORD	SAMMY KAMAN MOUND'U
PLOT NUMBER	KLS/24/11 polt NO 019
HOUSE NUMBER	07
P.O.BOX	67611
POST CODE	0702
ID NUMBER	3570001
NO OF LIGHTS	9
NO OF SOCKETS	2
PLEASE INDICATE ELECTRIC APPLIANCES	TV RADIO COOKER FRIDGE
INDICATE TYPE OF USAGE REQUIRED - PLEASE TICK ONE	DOMESTIC DE BUSINESS
SIGNATUREX. Adverse (PLEASE ATTACH COPY O Please direct any inquiries to N	F ID) Marketing Officer, West (Kanyiva Kahare) on Tel



Typical Additional Unplanned Loads



Typical Additional Unplanned Loads



Bypassed Transformer fused element



Households electricity sources



Figure 1: Households equipment rate for electric appliances

Source: Customer Connection Policy 2006 EDF / Axenne / Abedares



Figure 2: Distribution of economic activities according to the reasons of non connection to KPLC grid.

Source: Customer Connection Policy EDF / Axenne / Aberdares



Figure 3: Distribution of the economic activities expenditures by types of energy

Source: Customer Connection Policy EDF / Axenne / Aberdares

Monthly households energy expenditures



2515 Ksh per household per month

Figure 4: Households expenditures by use

Source: Customer Connection Policy EDF / Axenne / Aberdares

Monthly households energy expenditures by energy



Figure 5: Monthly household expenditures by energy sources

Source: customer connection policy EDF / Axenne / Abadears



Socio-Economic Factors Affecting Energy Demand in Kibera Slum Electrification

• Demography:

- Dynamic shifts in usage in the households /businesses
- Cultural practices & lifestyles in the various villages
- Compartmentalization of Kibera into ethnic and economic groups.
- Conversion from other energy sources:
 - Barriers by utility in wiring costs, connection charges and long processes.
 - Local providers coercing and threatening would be customers.
 - Goal incongruence between tenants and landowners
- Technology in use:
 - Load limiters suppressed natural load growth.
 - Obsolete technology (turrets) with no back up materials
 - Pre-payment metering system provides load growth freedom but large cost outlay.

Socio-Economic Drivers Challenge in Energy Demand in Kibera Benefits to Utility Cont'd

- Policy & Regulation
 - Land tenancy affecting spending on fixed luxurious items (no refrigeration loads)
 - Effects of the KENSUP upgrading program
 - Use of Life-line tariff restricts natural load growth
 - ERB tariff approval had no special slum tariff
 - Limited financial gains for the utility.
- Others
 - Aggressive demand side management interventions/renewable energy sources.
 - Security of early entrants from cartels
 - Customers payment mode and back up support system discourage growth.

Way Forward

- Engagement of social scientists to complement marketers in market survey.
- Use of integrated approach to inform on load growth patterns.
- Analytical methodologies for qualitative analyses of socio-economic drivers of energy demand.
- Campaign for tariffs that can benefit both slum users and utility.
- Source for funding of prepayment metering systems to enhance customer flexibility in energy use.
- Analytical methodologies to measure receptivity of slums dwellers to the slum electrification programs.

APPRECIATION

THANK YOU

