UTILITY 2.0: ELECTRIFICATION THROUGH MINI-GRID INTEGRATION

By Isaac Rosenthal
5 MAJOR CHALLENGES IN UGANDA

• ACCESS TARGETS
  • 2025: 2 MILLION NEW CONNECTIONS -- MORE THAN 2X RECENT PACE
  • 2030 (SDG7): UNIVERSAL ACCESS (>5 M NEW CONNECTIONS) -- 3X RECENT PACE

• CAPITAL REQUIRED TO ACHIEVE ACCESS TARGETS
  • COST OF ‘BUSINESS AS USUAL’: COULD BE $5 TO $10 BILLION OR MORE – STRONG DRIVE TO DEVELOP ALTERNATIVES

• FINANCIAL SUSTAINABILITY OF NEW CONNECTIONS
  • LOW HOUSEHOLD DEMAND, USAGE AT PEAK TIMES (HIGHEST COST), MANY AT LOWEST TARIFF (‘LIFELINE’ RATE)

• NEED FOR DEMAND GROWTH
  • FINANCIAL SUSTAINABILITY OF NEW HOUSEHOLD CONNECTIONS
  • NEW SUPPLY FROM LARGE NEW HYDROPOWER PROJECTS 3-4X PREVIOUS

• CONSTANT PRESSURE ON TARIFF, CAPEX, OPEX
  • STRONG DRIVE FOR INNOVATION, OPENNESS TO CONSIDERING ALTERNATIVES

THESE ARE THE STRATEGIC DRIVERS MOTIVATING NEW BUSINESS MODELS
3 MAIN DRIVERS OF LCOE AND CONNECTION COST

• UP-FRONT CAPITAL INVESTMENT (CAPEX)
  • UTILITY VIEW: LIMITED, REGULATED, ULTIMATELY IN CUSTOMER TARIFF, NEEDS TO BE APPROVED
  • MINI-GRID IPP VIEW: SCARCE, EXPENSIVE, OFTEN USE EQUITY CAPITAL TO FUND INFRASTRUCTURE ASSETS (WHERE LONG TERM, LOWER COST DEBT WOULD BE MORE APPROPRIATE); RISK OF ‘STRANDED ASSETS (GRID ARRIVAL)’
  • SENSITIVITY: A 50% CAPEX REDUCTION COULD YIELD A $0.40-$0.60/KWH POWER COST REDUCTION

• OPERATING COSTS (OPEX)
  • UTILITY VIEW: REGULATED, IN CUSTOMER TARIFF, CONSTANT PRESSURE FOR OPERATING EFFICIENCY, TO SERVE MORE CUSTOMERS FOR LESS – UTILITIES EXPERIENCED WITH OPERATING AT LOW COST
  • MINI-GRID IPP VIEW: PRIORITIZE CUSTOMER SERVICE AND RELATIONSHIP; BUT LIMITED WAYS TO LEVERAGE FIXED COSTS AND LARGE SCALE IN FUNCTIONS LIKE BILLING, COLLECTIONS, CUSTOMER SERVICE INQUIRIES
  • SENSITIVITY: A 20-25% OPEX REDUCTION COULD YIELD A $0.30-$0.60/KWH POWER COST REDUCTION

• COST OF CAPITAL
  • THERE’S ONLY SO MUCH CASH FLOW – MORE TO INVESTORS MEANS LESS TO IPP OR HIGHER COST TO CUSTOMERS
  • UTILITY MAY HAVE STRONGER BALANCE SHEETS, ACCESS TO LOWER COST DEBT
  • SENSITIVITY: A 600 BASIS POINT (6 PERCENTAGE POINTS) REDUCTION IN CAPITAL COST COULD YIELD AT LEAST A $0.50/KWH REDUCTION IN POWER COST

THESE ARE THE FINANCIAL DRIVERS MOTIVATING NEW BUSINESS MODELS
CORE IDEA

Use a combination of:

• Flexible, modular, mobile leased decentralized generation assets

• Commercial partnership, motivated by profit potential:
  - The utility
  - A mini-grid developer
  - An equipment supplier/lessor
  - A demand developer(s)

• Low-cost financing

• Planned integration, from the start

• Regulatory support and enabling approvals where needed

Phased Approach:

Phase 0: Develop a low-initial-cost plan for multiple sites that includes grid integration at a pre-determined demand level which the utility would find attractive, on pre-agreed integration terms

Phase 1: Provide initial electrification with a mini-grid, using leased generation assets; engage Demand Developer(s) to grow demand

Phase 2: Integrate with the Grid on the pre-agreed terms, when the pre-determined demand level or an agreed time limit is reached

Phase 3: Redeploy Site 1 generation assets to the next site, and repeat – using many of the same assets
LOOKING INTO 3 ALTERNATIVE BUSINESS MODELS

**MINI-GRID LED INTEGRATION MODEL (CURRENT PILOT PLAN)**

- **APPROACH:** Partner with equal or better quality at lower cost provides the function
- **CURRENT VIEW:** Utility builds the network, IPP owns customer/builds demand, other options being explored — with the goal of driving down OPEX without compromising customer satisfaction and demand

**LOW CAPEX BUSINESS MODEL (‘FLEXIBLE ASSET’)**

- **APPROACH:** Drive down soft costs and hard CAPEX costs through standardization, leasing and mobility
- **CURRENT VIEW:** Standardized, modular solar generation, lowest cost provider builds the network, equipment is leased to reduce CAPEX, find lower-CAPEX alternatives to battery storage

**LOW CAPITAL COST BUSINESS MODEL (‘UTILITY LED’)**

- **APPROACH:** Leverage utility balance sheet and lower capital cost to purchase and finance at lower cost
- **CURRENT VIEW:** Utility buys and finances the assets, IPP owns the customer/builds demand, potential economics and sharing of value between partners being explored

**EACH MODEL Focuses on one of the key financial drivers**
POTENTIAL BENEFITS

• Utility:

• Mini-Grid Developer:

• Uganda:
QUESTIONS?
THANK YOU