GRID INTEGRATION AND PRIVATE SECTOR SPDs:
BUILDING FOR BOTH TODAY AND THE FUTURE
Kenya’s demographics

Northern Kenya

Very few people, far from the main grid

Southern Kenya

Many people, near the main grid
Electrification in Northern Kenya

Very few people, far from the main grid

- Sparse distribution of remote towns and villages
- ~20 KPLC-run micro-grids already operating, with tariffs cross-subsidized to be unified with the south
- Additional 20-50 town micro-grids currently being tendered by REA (bids for first 22 were due on 23 September 2016)
- Limited scope for private sector involvement in micro-grid development at any worthwhile scale with remaining sites available
Electrification in Southern Kenya

Many people, near the main grid

- High level of power line penetration – most unelectrified people are near power lines
  - So many people becoming near-grid was largely driven by REA’s program connecting schools and health clinics over the past 5-10 years

- Many underutilized transformers due to the REA schools/clinics programs (TX would be installed and only serve a single community facility, not the surrounding homes)

- Last Mile Connectivity Program is focused on densifying connections around those underutilized transformers
  - Drives down cost/connection by using ready boards and connecting customers in clusters
What is a micro-grid? What is an SPD?

- SPDs are just micro-grids that happen to be connected to the main grid.
What is the purpose of a micro-grid or SPD?

1) Advance energy access faster – build systems today and/or solve the *distribution* challenge by financing ‘last mile’ connection

2) Improve grid quality at the grid edge using storage and/or backup generation

3) Build the foundations of the future energy system for the region from the bottom up

What a micro-grid is NOT:
• Intended to compete with the main grid – it should be built for complementary integration
• Better at producing electrons than the main grid
The future grid system, globally

1. Distributed Generation
   Ubiquitous
2. Distributed Storage at Home, Neighborhood, and Municipal levels (as well as Commercial)
3. Increasingly high % of renewables at Industrial scale
4. Smart metering at consumption nodes
Critical for Africa’s power systems to converge on the future of the global grid, not the old/current model.

- Smart Metering
- Distributed Generation
- Distributed Storage
- More Renewables
- Deregulation
Micro-grids / SPDs are the building blocks of the future grid.

The future grid architecture can be built in modular pieces: micro-grids and SPDs.

These modules include:

- **Smart metering** (not the same as pre-paid metering)
- **Embedded storage** for improving downstream power quality in near term, and bidirectional grid stabilization in long term
- **Embedded renewable energy** generation (without the need for net metering policies)

These modular systems can be built with or without a grid connection immediately, but all are built for integration.
Why should countries encourage private sector SPDs and micro-grids?

1) **Good for the utility** – help the utility sell more power through existing infrastructure (more revenue for the utility with zero additional capex or opex)
   - Secondary benefits – grid health data from smart metering, grid balancing support from distributed storage

2) **Good for customers** – grid lines will be built faster, and reliability will be improved

3) **Good for funders** – galvanized private sector capital to leverage public sector funds

4) **Good for the government / regulator** – start future proofing the national grid and stimulating innovation the grid-edge
What needs to happen for private sector MGs / SPDs to exist in Kenya? (Part 1)

**Regulatory**

1) **Transparent framework for tariffs**, based on regulated returns for projects
   - Simple formula:
     - Inputs – CAPEX, CAPEX SUBSIDY, REGULATED RETURN
     - Outputs – TARIFFS
     - → *tariffs can be driven down by subsidies on capex, at the discretion of donors / government*

2) **Framework for grid integration**: allow SPDs to purchase at wholesale rates and/or fair purchase prices of assets by main utility

3) **Programmatic approach** to registration / licensing, NOT project-based or concession-based (EIAs, registration with regulator)

4) **Simple, output-based technical standards** (voltage for end-user, uptime, safety)
What needs to happen for private sector MGs / SPDs to exist in Kenya? (Part 2)

Commercial / Financial

1) Symmetrical subsidies
   • LMCP subsidies for the government to connect near-grid customers in Kenya will make it impossible for private sector MG or SPD companies to compete
   • If the donor community wants there to be any future for private sector SPDs / MGs in Kenya, private companies must also receive subsidies analogous to those received by KPLC under the LMCP.

2) Decoupling from “Green” Mandate
   • Energy access and renewable generation are two different challenges
   • The best thing we can do for going green is to build robust grids (the grid is the largest, cheapest “battery” on the market)

3) Consolidation of Funding
   • Many small grants available for early stage innovation / piloting
   • This funding environment enables prototyping, but not scale
   • The various supporters of micro-grids must coordinate on larger tranches of funding if the sector is to move to the next level
Thank You