RURAL ELECTRIFICATION PROGRAMME IN KENYA

by
Zachary O. Ayieko
Chief Executive Officer
Rural Electrification Authority

AEI Practitioners Workshop - Dakar, Senegal 2011

November 2011
OUTLINE

1. Overview of Kenya
2. Energy Sector Institutional structure
3. Rural Electrification Authority
4. Funding for Rural Electrification Programme
5. Mode of Rural Electrification in Kenya
6. REA/KPLC working relationship
7. Renewable Energy in Kenya
8. Challenges
9. Factors Contributing to Accelerated Electricity Access
1. OVERVIEW OF KENYA

- Kenya is located in East Africa and borders Ethiopia, Somalia, Tanzania, Uganda & Sudan
- Population about 40M
- The national languages are English & Kiswahili
Kenya is well known for:

- A national park within the city and world famous game reserves & white beaches
- Home to the big five that include; Lion, Elephant, Buffalo, Rhino and Leopard
Overview cont.....
Kenya is also famed for its long distance runners.
2. ENERGY SECTOR INSTITUTIONAL STRUCTURE
Benefits of Rural Electrification

- Rural electrification has many benefits to the rural Populace.

- These include; empowerment of rural population in education, health, lighting, modern farming, fish farming, employment creation, security enhancement, improvement in standard of living, among others.
3. RURAL ELECTRIFICATION AUTHORITY

REA was established in 2006 through Energy Act No. 12 of 2006 and operationalised in July 2007

**Mandate:** to accelerate rural electrification

**Vision 2030**

All citizens to have electricity by 2030
REA STRATEGIC PLAN

• Phase I 2008-2012 - Connect all Public Facilities
  - Connect 1 Million Customers
  - Increase connectivity from about 12%-22%
  - Increase access to 100%

• Phase II 2013-2022 - Connect Customers (increase
  - Connectivity from 22% to 65%)

• Phase III 2022-2030 - Connect Customers (increase
  - Connectivity from 65% to 100%)

Note: Access means households within 1.2km of M.V/L.V line while connectivity is the actual connection to electricity.
Public facilities electrified by June 2011

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>NO. OF FACILITIES ELECTRIFIED FROM 1973-2003/04</th>
<th>NO OF FACILITIES ELECTRIFIED 2003/04 - 10/11</th>
<th>TOTAL ELECTRIFIED</th>
<th>TO BE ELECTRIFIED 2010/11-2012/13</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trading Centres</td>
<td>1,096</td>
<td>5,783</td>
<td>6,879</td>
<td>3,371</td>
<td>10,250</td>
</tr>
<tr>
<td>Public Secondary Schools</td>
<td>285</td>
<td>4,163</td>
<td>4,448</td>
<td>2,478</td>
<td>6,926</td>
</tr>
<tr>
<td>Health Centres</td>
<td>348</td>
<td>2,082</td>
<td>2,430</td>
<td>1,516</td>
<td>3,946</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1,729</strong></td>
<td><strong>12,028</strong></td>
<td><strong>13,757</strong></td>
<td><strong>7,365</strong></td>
<td><strong>21,122</strong></td>
</tr>
</tbody>
</table>

**Level of Electrification**

- 4%
- 10%
- 18%
- 22%

**Access level**

- 15%
- 70%
- 100%

Funds required to electrify the remaining facilities: Kshs.25 billion (US$250M)

Funds committed: Kshs.17 billion (US$170M). Balance: Kshs.8 billion (US$80M)
## 4. Funding for Rural Electrification Projects

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>FUNDING KSH.MN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal sources</td>
<td>4,271</td>
<td>31,475</td>
</tr>
<tr>
<td>External sources</td>
<td>2,994</td>
<td>5,883</td>
</tr>
<tr>
<td>Total</td>
<td>7,265</td>
<td>37,358</td>
</tr>
</tbody>
</table>
Funding for Rural Electrification Cont....

Main sources:

- Internal Sources (Exchequer) - 80%
- External (Development Partners) - 20%

Recent Development Partners

- World Bank
- AFD
- Spain
5. MODE OF RURAL ELECTRIFICATION IN KENYA

REA implements RE projects thro;

- Grid Extension
- Off-grid supply
  - Isolated diesel stations
  - Installation of solar PV, Wind and Biogas systems in public institutions
STRATEGIES OF IMPLEMENTATION

• Masterplan
• Stakeholders involvement
• Bulk Purchase of Materials
• Use of Labour and Transport Contractors
• Turnkey contracts
• Competitive tendering
  (Average cost per km for MV line US $ 10,000)
STANDARDS / ENGINEERING SPEC USED IN RURAL ELECTRIFICATION PROJECTS

- A joint technical project committee of REA and KPLC members decides on the standards and Specs for use in electricity subsector.

- The committee reviews regularly and the standards/ Specs of the various materials/designs.

- These standards are used both by KPLC and REA to ensure uniformity in the subsector.
6. REA/KPLC WORKING RELATIONSHIP

- REA hands over completed projects to KPLC for operation and maintenance based on the Service Level Agreement (SLA).

- The projects handed over to KPLC remain property of REA.

- REA does not pay KPLC for O&M of the projects since this is covered through the electricity retail tariff.
## 7. RENEWABLE ENERGY SOURCES

<table>
<thead>
<tr>
<th>Renewable Energy</th>
<th>Potential</th>
<th>Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Geothermal</td>
<td>7000MW</td>
<td>Rift Valley</td>
</tr>
<tr>
<td></td>
<td>Installed 200 MW</td>
<td></td>
</tr>
<tr>
<td>2 Solar</td>
<td>4-6 kWh/m2/day</td>
<td>Over 80% of land area</td>
</tr>
<tr>
<td>3 Wind</td>
<td>346 W/m2</td>
<td>Parts of Nairobi, Eastern, North Eastern and Coast</td>
</tr>
<tr>
<td>4 Small hydro</td>
<td>3,000 MW</td>
<td>Five drainage basins</td>
</tr>
<tr>
<td>5 Biomass - cogeneration</td>
<td>300 MW</td>
<td>Sugarcane growing belt</td>
</tr>
<tr>
<td>6 Others Biomass – Biogas, Power alcohol, biodiesel, etc</td>
<td>300 MW</td>
<td>Medium and high potential areas</td>
</tr>
</tbody>
</table>
PROGRAMME TO ENCOURAGE RENEWABLE ENERGY

a) Feed in tariff Policy

- Geothermal
- Wind
- Biomass
- Solar
- Small Hydro
- Biogas
b) Solar Energy

- ERC has gazetted solar water heating regulations for use in towns residential buildings.
- Formulating a framework to promote use of solar PV, wind and Biogas systems.
- Net metering policy to encourage solar energy generation in buildings.
- Commercial generation of solar energy
- Hybrid of diesel station with solar/wind power (ERC)
c) Wind energy potential

- Two wind generating plants 5.45 MW have been installed.
- Additional 625MW wind generation projects have been proposed; includes 300MW by L. Turkana Wind firm.
- A wind atlas with indicative data to guide investors has been developed.
- 55 wind masts and data loggers to collect wind specific data have been installed.
Biogas

• REA has developed two Pilot projects on biogas exploitation in two secondary schools using waste water.

• The lessons learned will be used in the promotion of such systems in other institutions countrywide.
8. CHALLENGES

i) Inadequate Funding

*Suggested solutions*

- Increased Budgetary allocations
- Community participation and Public - Private partnerships
- Provision of free way leaves

ii) Population Distribution in the Rural Areas

*Suggested solutions*

Land reforms that encourage organized group settlements
iii) High connection fee about US$ 400

*Suggested Solutions*

• Increased funding for extension of lines
• Deferred payments
• A revolving fund
• Aggressive marketing
iv) Vandalism of power line – e.g. transformers

Suggested Solutions

- Promote community participation/ownership of projects
- Placement of transformers in secure areas
9. FACTORS CONTRIBUTING TO ACCELERATED ELECTRICITY ACCESS

• Lead in Government Commitment
• Lead in Local funding
• Support from Development Partners
• Establishment of committed Lead Agencies
• Passion by stakeholders
• Community involvement
• Bulk purchase of materials
• Use of labour and transport contractors
• Promotion of organized settlement