SOLAR MINI-GRIDS WORKSHOP: REGULATORY FRAMEWORK AND QUALITY ASSURANCE: Grid Integration: Preparing for Future Grid Connection

Eng. Naomi Gichuhi
Chief Engineer, Distribution Planning
29.09.2016
Discussion Points

• KPLC Mission/Vision
• License
• Current Grid
• Proposed grid extension
• Existing Off grid stations
• Questions
• Recommendation
1. Focus

**Mandate**
Purchase bulk electricity supply, transmit, distribute, and retail electricity to end-use customers throughout Kenya

**Mission**
To provide world class power that delights our customers

**Vision**
Powering people for better lives
2. Strategic Themes

- Infrastructure Development
- Network Management
- Customer Centricity
- Loss Reduction

Resource Alignment
KPLC LICENSED to:

• Distribution in the KPLC Nairobi Region
• Distribution in the KPLC Mt Kenya Region
• Distribution in the KPLC West Region
• Distribution in the KPLC Coast Region as well as HSD thermal generation at Lamu and Mpeketoni.
• Distribution in Garissa Town and environs
• Distribution in Lamu Town and environs
<table>
<thead>
<tr>
<th>No</th>
<th>Description</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wajir</td>
<td>3.4</td>
</tr>
<tr>
<td>2</td>
<td>Mandera</td>
<td>2.330</td>
</tr>
<tr>
<td>3</td>
<td>Marsabit</td>
<td>2.940</td>
</tr>
<tr>
<td>4</td>
<td>Lodwar</td>
<td>2.46</td>
</tr>
<tr>
<td>5</td>
<td>Hola</td>
<td>1.224</td>
</tr>
<tr>
<td>6</td>
<td>Merti</td>
<td>0.250</td>
</tr>
<tr>
<td>7</td>
<td>Elwak</td>
<td>0.680</td>
</tr>
<tr>
<td>8</td>
<td>Habaswein</td>
<td>0.844</td>
</tr>
<tr>
<td>9</td>
<td>Baragoi</td>
<td>0.440</td>
</tr>
<tr>
<td>10</td>
<td>Mfangano</td>
<td>0.650</td>
</tr>
<tr>
<td>11</td>
<td>Eldas</td>
<td>0.184</td>
</tr>
<tr>
<td>12</td>
<td>Takaba</td>
<td>0.380</td>
</tr>
<tr>
<td>13</td>
<td>Rhamu</td>
<td>0.184</td>
</tr>
<tr>
<td>14</td>
<td>Lokichoggio</td>
<td>0.640</td>
</tr>
<tr>
<td>15</td>
<td>Laisamis</td>
<td>0.184</td>
</tr>
<tr>
<td>16</td>
<td>Moyale</td>
<td>0.652</td>
</tr>
<tr>
<td>17</td>
<td>North Horr</td>
<td>0.184</td>
</tr>
</tbody>
</table>
KETRACO TRANSMISSION WORKS: KPLC to do Medium Voltage Lines and to connect customers

<table>
<thead>
<tr>
<th>No</th>
<th>Transmission Projects</th>
<th>Substation</th>
<th>Feed Out Lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kindaruma - Mwingi - Garrissa line</td>
<td>Mwingi &amp; Garrissa</td>
<td>Ongoing</td>
</tr>
<tr>
<td>2</td>
<td>Rabai – Malindi – Garsen - Lamu</td>
<td>Kakuyuni, Garsen, Lamu</td>
<td>Ongoing</td>
</tr>
<tr>
<td>3</td>
<td>Eldoret – Kitale line</td>
<td>Kitale</td>
<td>Ongoing</td>
</tr>
<tr>
<td>4</td>
<td>Nanyuki - Isiolo - Meru</td>
<td>Isiolo</td>
<td>Ongoing</td>
</tr>
<tr>
<td>5</td>
<td>Athi River and Isinya substation</td>
<td>Athi River</td>
<td>Ongoing</td>
</tr>
<tr>
<td>6</td>
<td>Bomet - Sotik Line</td>
<td>Bomet</td>
<td>Ongoing</td>
</tr>
<tr>
<td>7</td>
<td>Ishiara - Kyeni Line</td>
<td>Kyeni</td>
<td>Ongoing</td>
</tr>
<tr>
<td>8</td>
<td>Lessos - Kabarnet Line</td>
<td>Kabarnet</td>
<td>Ongoing</td>
</tr>
<tr>
<td>9</td>
<td>Mwingi - Kitui - Wote - Sultan Hamud Line</td>
<td>Kitui, Wote &amp; Sultan Hamund</td>
<td>Design stage</td>
</tr>
<tr>
<td>10</td>
<td>Kisii - Awendo Line</td>
<td>Awendo</td>
<td>Design Stage</td>
</tr>
<tr>
<td>11</td>
<td>Turkwel - Ortum - Kitale</td>
<td>Ortum</td>
<td>Design Stage</td>
</tr>
<tr>
<td>12</td>
<td>Machakos-Konza &amp; Isinya-Namanga*</td>
<td>Konza &amp; Namanga</td>
<td>Design Stage</td>
</tr>
<tr>
<td>13</td>
<td>Nanyuki - Rumuruti Line</td>
<td>Rumuruti</td>
<td>Design stage</td>
</tr>
<tr>
<td>14</td>
<td>Olkaria - Narok Line</td>
<td>Narok</td>
<td>Design stage</td>
</tr>
</tbody>
</table>
EXISTING AND PROPOSED TRANSMISSION LINES
Theme 3: Customer Centricity

Connectivity Strategies

- GPOBA
- LAST MILE
- PRE-INVESTMENT SCHEMES
- NORMAL CONNECTIONS

Universal Access

- 2015: 3.6M Households, 44.4%
- 2016: 4.8M Households, 60%
- 2017: 6.8M Households, 80%
- 2018: 7.6M Households, 87.1%
- 2019: 8.4M Households, 93.7%

Other Marketing initiatives

- Partnering with other institutions – Stima loan
  - Payment by instalments
- Marketing Segmentation – Standard, premium
4. KPLC's Efforts Towards Promoting Renewable Energy

Generation mix 2012/13
Generation Mix Dispatched 2015/16

- Hydro: 38%
- Geothermal: 47%
- Thermal: 13%
- cogeneration: 1%
- solar: 1%
- wind: 0%
- Imports: 0%
- Imports: 0%

2015/16

Reduction in average tariffs between June 2014 and November 2015:

- Industrial from **US$cts 19.0 to 14.82 per KW/h (20.5%)**
- Domestic from **US$cts 15.1 to 12.54 KW/h (21.13%)**
Feed In Tariff
Instrument for promoting generation of electricity from renewable energy sources.

Renewable Power producer | Sells at predetermined Tariff for a given period | Off-taker

Panels → Inverter → Export Meter → Meter → Power Distribution Network
Questions to mini-grid owners

• What plan do the mini-grid owners have once KPLC network reaches where mini grids are?
• Will the owners remain as Generating and Distributing Companies?
• Will they own and operate the Generating Stations only?
• Will they opt for Power Purchase Agreements (PPA) agreement with KPLC?
• Will they opt for a “large customer” operation arrangement with KPLC?
RECOMMENDATIONS

• Energy Regulatory Commission (ERC) and MOEP to come up with guiding rules/regulations relating to relationship between distribution licensees and mini-grid owners.

• KPLCs preferred position is to take over the mini-grid distribution network and to enter into a PPA agreement with the initial owner of the mini-grid

• Advantages:
  • Common standard for all Kenyans
  • Uniform tariff
  • Easier for KPLC to do extensions within and beyond the mini-grid
  • Allows uniform development within the country which would have been skewed if various firms offer different tariffs.

Note: Mini-grids must be built to minimum technical standards if the owners plan to eventually hand them over to KPLC.
Questions?