Transmission Grid Development Plan

Eriasi Kiyemba
Managing Director/CEO
Uganda Electricity Transmission Company Limited (UETCL) is a public limited company and was incorporated on 26th March, 2001 after unbundling of Uganda Electricity Board into three successor companies.
Government Policy and Strategy

- National Development Plan
- MEMD Policy Statement
- Power Sector Strategic Plan
- Power Sector Investment Plan
- Millennium Development Goals
- Renewable Energy Policy
- Nuclear Energy Policy
- Sustainable Energy for All by 2030
- Vision 2040
- Regional (EAC, NBI & COMESA)
Power sector objectives

- To make the power sector financially viable
- To increase sector’s efficiency
- To meet the growing demand for electricity and increase area coverage
- To improve the reliability and quality of electricity supply
- To attract private capital through private sector participation
- To take advantage of export opportunities
UETCL mandate

- Owns and Operates the High Voltage Transmission Grid (HVTG) above 33kV
- Co-ordinates the power system to achieve balance between supply and demand
- Responsible for dispatching generation facilities
- Bulk Power Purchase and Sales (Single Buyer)
- Responsible for Power Exports and Imports

In this regard, UETCL has two core businesses, Transmission System Operator and Single Buyer
<table>
<thead>
<tr>
<th>Transmission Lines</th>
<th>220kV (150km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>132kV (1443km)</td>
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<tr>
<td></td>
<td>66kV (35.2km)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transformer capacity</th>
<th>132/33kV = 677.5MVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>132/11kV = 220MVA</td>
</tr>
<tr>
<td></td>
<td>66/11kV = 28MVA</td>
</tr>
<tr>
<td></td>
<td>33/66kV = 28MVA</td>
</tr>
</tbody>
</table>

| Reactive Power Compensation | 98MVArS |
Rationale for Grid Investment Plan

- To evacuate generation capacities
- To improve system transmission efficiency
- To meet forecasted demand
- To improve reliability and security of supply
- To promote Regional power trade
The UETCL Transmission Expansion Plans are categorised into:

- Evacuation Transmission lines: For evacuation of power from the proposed generation sites to the grid

- System extension projects: for improvement of reliability, quality of supply and increase grid area coverage. Facilitate implementation of Government renewable energy policy
Transmission Grid Investment Plan

- Re-investment projects: For upgrading to enhance transmission capacity
- Regional Interconnection lines: For Regional power trade and security of supply.
# Grid Investment Plan

## POWER EVACUATION PROJECTS

<table>
<thead>
<tr>
<th>Project</th>
<th>Objectives</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bujagali Interconnection Project - Bujagali Switchyard Upgrade to 220kV</strong></td>
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</tr>
</tbody>
</table>
| ▪ Provision of adequate transmission capacity to evacuate power generated at Bujagali Hydro Power Station (HPS) to the existing National grid | ▪ EPC contract awarded to NCC  
▪ To be commissioned in 2014  
▪ Funded by AfDB and JICA  
▪ US$ 13.02 million |
| **Nkenda – Fort Portal – Hoima 220kV Transmission lines component (234km) and associated Substations** | | |
| ▪ Provision of transmission capacity for system improvement in Kibaale, Hoima, Masindi, Kabalole and Kyenjojo Districts as well as power evacuation from Kabaale HFO, Kinyara, Buseruka and Waki Hydropower Plants | ▪ RAP Implementation in progress  
▪ Procurement of supervision consultant ongoing  
▪ Tender documents preparation ongoing  
▪ To be commissioned in 2015  
▪ Funded by GON and AFD  
▪ NOK 300 million  
▪ US$ 21.15 million |
## Power Evacuation Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Objectives</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isimba Interconnection project 132kV (40km)</td>
<td>▪ Provision of adequate transmission capacity to evacuate 180MW from Isimba HPS.</td>
<td>▪ Feasibility study concluded in 2012</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ To be commissioned in 2017</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ Soliciting for financing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ US$14.46 million</td>
</tr>
<tr>
<td>Karuma Interconnection project (324km-400kV &amp; 80km-132kV)</td>
<td>▪ Provision of adequate transmission capacity to evacuate 600MW from Karuma HPS.</td>
<td>▪ Feasibility study concluded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ RAP implementation in progress</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ To be commissioned 2018</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ To be financed by China EXIM Bank</td>
</tr>
<tr>
<td></td>
<td></td>
<td>▪ US$ 317.6 million</td>
</tr>
</tbody>
</table>
### Grid Investment Plan

#### POWER EVACUATION PROJECTS

<table>
<thead>
<tr>
<th>Project</th>
<th>Objectives</th>
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</tr>
</thead>
</table>
| Ayago Interconnection 400kV Project (58km)   | ► Provision of adequate transmission capacity to evacuate power generated at proposed Ayago HPS. | ► Feasibility in progress  
► To be commissioned 2018  
► Soliciting for financing |
| Mirama – Kikagati – Nshongzezi 132kV (55km)   | ► Provision of transmission capacity to evacuate power from Kikagati power plant (Tronder Energy) | ► Preparing RFP documents for feasibility study  
► To be commissioned 2016  
► Financed by GON |
| Kabulasoke – Kiboga – Hoima 132kV (205km)     | ► Provision of transmission capacity to evacuate power from 9MW Buseruka, 40MW Kinyara and 57MW Thermal power plants | ► Preliminary studies concluded  
► To be commissioned 2015  
► 27$ million  
► Financed by GOU |
| Hoima – Kinyara - Kafu 220kV (93km)           | ► Provision of transmission capacity to interconnect Karuma T-line to the Hoima – Nkenda T-line and to evacuate 40MW from Kinyara power plant | ► Feasibility study in progress  
► To be commissioned 2016  
► Financed by GON |
<table>
<thead>
<tr>
<th>PROJECT</th>
<th>OBJECTIVES</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulambuli – Kachumbala 132kV transmission line (60km), 2X32/40MVA 132/33kV substations at Mbale and Bulambuli, and switching station at Kachumbala</td>
<td>▪ To evacuate power generated from the planned mini hydro plants namely: Siti 1&amp;2 (21.5 MW), Ngenge 1&amp;2 (20 MW), Muyembe (10 MW) ▪ To supply power for the upcoming commercial and industrial activities in the region e.g. Budaka cement factory</td>
<td>▪ Soliciting for financing ▪ To be commissioned 2016 ▪ 49$ million ▪ Soliciting for financing</td>
</tr>
<tr>
<td>Mirama-Kabale 132kV transmission line (76km)</td>
<td>Provision of transmission capacity to evacuate power from Kabale Peat thermal power plant</td>
<td>▪ Feasibility study in progress ▪ To be commissioned 2015 ▪ Soliciting for financing ▪ Financed by AfDB ▪ 36.8$ million</td>
</tr>
<tr>
<td>Achwa/Agago-Kitgum-Gulu 132kV transmission line (120km)</td>
<td>▪ Provision of transmission capacity to evacuate power from Achwa I,II,&amp;III ▪ Improvement of power supply to Gulu and Kitgum town</td>
<td>▪ Preliminary studies concluded ▪ To be commissioned 2016 ▪ Funded by GOU ▪ 20$ million</td>
</tr>
</tbody>
</table>
## Grid Re-investment Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Objectives</th>
<th>Status</th>
</tr>
</thead>
</table>
| Tororo – Opuyo – Lira 132kV transmission Line (260km) | - Improvement on reliability and availability of power to the Eastern and Northern regions of Uganda. | - Construction in progress  
- RAP Implementation in progress  
- To be commissioned 2015  
- 33.4$ million  
- Financed by AfDB |
| Mutundwe-Kabulasoke Restrining 132kV (84.5km) | - Improvement of reliability and quality of supply                         | - Construction to start in 2013  
- Funded by UETCL  
- US$ 1.5million |
<table>
<thead>
<tr>
<th>Project</th>
<th>Status</th>
<th>Status</th>
</tr>
</thead>
</table>
| Mbarara– Nkenda 132kV Transmission Line (160km) | ▪ Improvement on reliability, availability and quality of power to the Western region of Uganda-Kasese, Fort Portal. | ▪ Construction in progress  
▪ RAP Implementation in progress  
▪ To be commissioned 2015  
▪ Funded by AfDB  
▪ 38.7$ million          |
| Mutundwe-Entebbe 132kV transmission line (35km) | ▪ Extension of the high voltage grid to the Entebbe region to improve quality of supply and to evacuate power from proposed solar generation power plant | ▪ Feasibility study concluded  
▪ Procurement of ESIA and RAP study consultant  
▪ To be commissioned 2015  
▪ To be funded by KfW  
▪ 21 Euro million |
| Opuyo-Moroto 132kV line (160km) and substation | ▪ To extend the grid to supply power to Karamoja region                  | ▪ Concluding Feasibility study  
▪ To be commissioned 2015  
▪ To be funded by ISDB  
▪ 65.1$ million |


## System Extension Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Objectives</th>
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</tr>
</thead>
</table>
| Namanve – Namanve South 132kV (5.7km) transmission line and Namanve South substation | - Provision of transformation capacity to cater for demand within the industrial areas (Industrial park projects) | - Feasibility study in progress  
- To be commissioned 2015  
- To be financed by China EXIM Bank |
| Nalubaale – Tororo 132kV (15km) Iganga Industrial park T-off and associated substations | - Provision of transformation capacity to cater for demand within the industrial areas (Industrial park projects) | - Procurement of ESIA & RAP study Consultant  
- Procurement of Consultant for supervision of works  
- To be commissioned 2015  
- To be financed by China EXIM Bank |
| Nalubaale – Namanve 132kV (10km) Transmission Line: Mukono Industrial Tee Off and associated substations | - Provision of transformation capacity to cater for demand within the industrial areas (Industrial park projects) | - Procurement of ESIA & RAP Consultant  
- Procurement of Consultant for supervision of works  
- To be commissioned 2015  
- To be financed by China EXIM Bank |
# Grid Investment Plan

## System Extension Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Objectives</th>
<th>Status</th>
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</thead>
</table>
| Namanve – Luzira 132kV (15km) and associated substations | • Provision of transformation capacity to cater for demand within the industrial areas  
• (Industrial park projects) | • Procurement of ESIA & RAP study Consultant  
• Procurement of Consultant for supervision of works  
• To be commissioned 2015  
• To be financed by China EXIM Bank |
| Masaka-Mbarara 220kV (135km) | • Reinforcing the Western transmission line to cater for increasing demand in the western Region and implementation of NELSAP/EAC Interconnection Project | • Procurement of Feasibility study and ESIA & RAP study Consultants  
• Financed by AFD under ITF  
• To be commissioned 2017 |
## System Extension Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Status</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kawanda – Masaka 220kV transmission line (142km)</td>
<td>▪ The programme is aimed at reinforcing the capacity of the Western transmission line to cater for the increasing demand in the towns of Masaka, Mbarara, Kasese, Fort Portal, Kabale, Bushenyi</td>
<td>▪ Construction stage (Procurement of EPC contractor) ▪ To be commissioned 2016 ▪ 95.1$ million ▪ Financed by WB/IDA</td>
</tr>
<tr>
<td>Lira-Gulu-Nebbi-Arua 132kV (350km) and Gulu, Nebbi &amp; Arua substations</td>
<td>Improvement of reliability and quality of power supply to the North and North West Regions of Uganda</td>
<td>▪ Feasibility study stage ▪ Procurement of Consultant for feasibility study and ESIA and RAP ongoing ▪ To be commissioned 2016 ▪ Financed by WB/IDA</td>
</tr>
</tbody>
</table>
## Grid Investment Plan

### Regional Interconnection projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>Bujagali-Tororo (Uganda) - Lessos (Kenya) 220kV transmission line(127km)</td>
<td>▪ Regional NELSAP Grid interconnection for power trade and improvement of security of supply</td>
<td>Construction in progress</td>
</tr>
<tr>
<td></td>
<td>▪ Construction in progress</td>
<td>To be commissioned 2015</td>
</tr>
<tr>
<td></td>
<td>▪ To be commissioned 2015</td>
<td>UA 7.5 million &amp; JPY 5.41 million (for both NELSAP projects)</td>
</tr>
<tr>
<td>Mbarara-Mirama (Uganda) - Birembo (Rwanda) 220 kV transmission line(66km)</td>
<td>▪ Regional NELSAP Grid interconnection for power trade and improvement of security of supply</td>
<td>Construction in progress</td>
</tr>
<tr>
<td></td>
<td>▪ Construction in progress</td>
<td>To be commissioned 2014</td>
</tr>
</tbody>
</table>
## Grid Investment Plan

### Regional Power trade projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Status</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masaka-Mutukula- Mwanza 220kV transmission line(85km)Uganda’s side</td>
<td>Regional EAC Grid interconnection for power trade and improvement of security of supply</td>
<td>Feasibility study concluded  To be implemented under EAC</td>
</tr>
<tr>
<td>Nkenda (Uganda)-Mpondwe – Beni (DRC) 220kV transmission line(70km)</td>
<td>Regional NELSAP Grid interconnection for power trade and improvement of security of supply</td>
<td>Feasibility study in progress  Funded by GON  To be implemented under NELSAP</td>
</tr>
<tr>
<td>Karuma – Nimule (south Sudan) (400kV line): Uganda’s part</td>
<td>Regional grid interconnection for power trade and improvement of security of supply</td>
<td>Sourcing for financing  To be implemented under NELSAP</td>
</tr>
</tbody>
</table>
Eastern African Power Pool (EAPP)

- Established on 24th February 2005
- Objective; Making available to the Eastern Africa Region an affordable electricity by pooling the available electrical energy resources in the region in an optimized and coordinated manner, in order to increase the access rate to electricity by the population and to promote regional integration.
Eastern African Power Pool (EAPP)

- The EAPP was ratified by Heads of State at the 11th Summit of COMESA as a specialized institution of COMESA for electrical power for Eastern Africa.
- Member States: Burundi, DR Congo, Egypt, Ethiopia, Kenya, Libya, Rwanda, Sudan, Tanzania and Uganda.
Benefits from developing interconnections and operating power pools include the following:

- reduction capital and operating costs through improved coordination among power utilities
Eastern African Power Pool (EAPP)

- optimisation of generation resources
- improved power system reliability with reserve sharing;
- enhanced security of supply through mutual assistance i.e. Emergency
- improved investment climate through pooling risks;
- -
Eastern African Power Pool (EAPP)

- coordination of generation and transmission expansion;
- development of a regional market for electricity trade.
END