UGANDA ELECTRICITY TRANSMISSION COMPANY LIMITED

UGANDA ELECTRICITY TRANSMISSION COMPANY

THEME: Demand Growth and Accelerated Access to Clean Energy

TOPIC: Presentation on the transmission preparedness for the upcoming evacuation demands.

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27th June 2018

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UGANDA ELECTRICITY TRANSMISSION COMPANY

Who are we?

Public limited company that was incorporated on 26th March,2001 after unbundling of Uganda Electricity Board into three successor companies.

Vision

- Electricity Transmission for sustainable regional development

Mission

- To buy, transmit and sell quality bulk power

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UETCL'S Mandate

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

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Grid Statistics

- Installed generation capacity- 930.54MW
- Firm generation capacity- Approx. 640MW
- Domestic Peak Demand–568MW
- System Peak Demand – 637MW
- Annual average power demand growth – 5.3% (2016/2017-domestic)
- Load factor – 74%

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UETCL Present Grid

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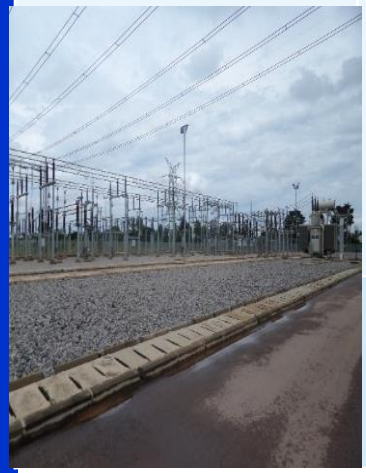
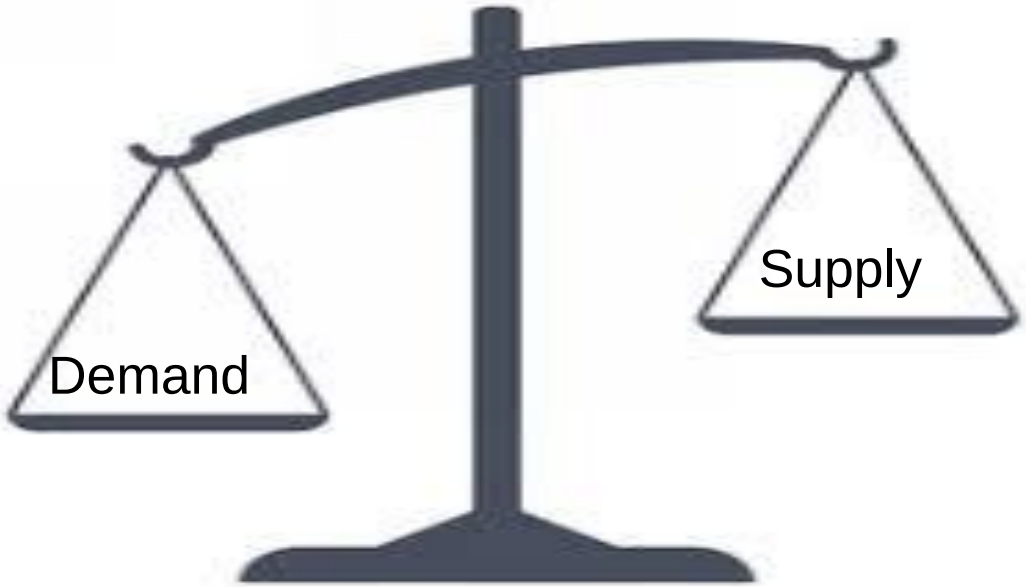


Equipment		Number	
	Support Structures	1820 Steel towers and 3380 wooden* structures	
	Circuit Length	220kV	602km
		132kV	1440km
		66kV	35km
	Transformers	220/132kV	500MVA
		132/33kV	897.5MVA
		132/11kV	220MVA
		66/11kV	28MVA
	Reactive Compensation	Capacitor Banks	98 MVAr
		Reactors	31MVAr

Problem Statement



	Average growth (2008 - 2017)
System peak demand (MW)	5.59%
Domestic demand (MW)	3.99%
System Energy (GWh)	7.5%
Domestic Energy (GWh)	6.9%

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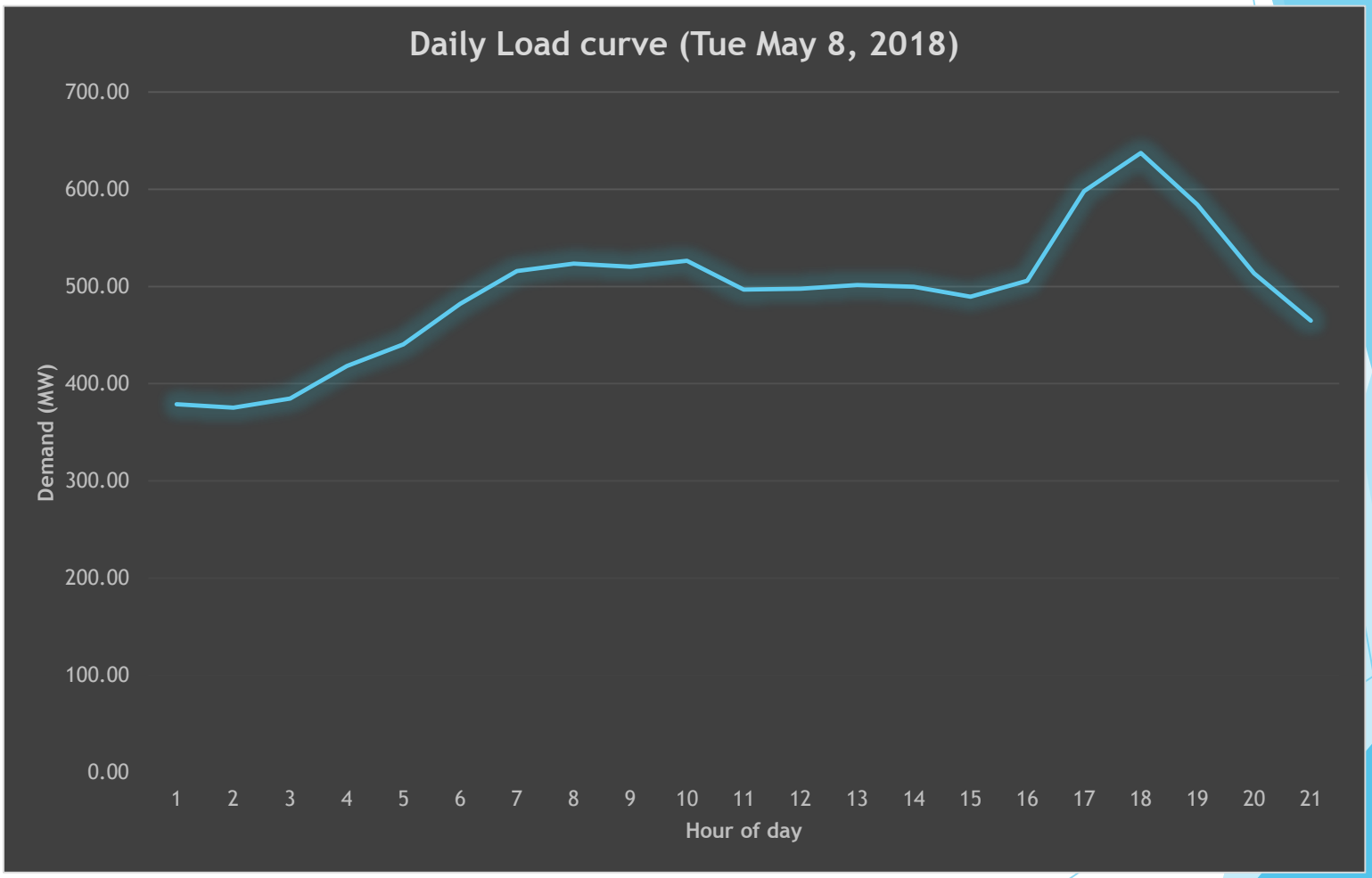
Historical Demand Trends

Year	Total Energy Sales including Export (GWh)	Growth	System Peak Demand (MW)	Growth	Domestic Sales (GWh)	Growth	Domestic Peak Demand (MW)	Growth
2007	1,825	17%	394.9		1,759	17%	379.7	
2008	2,017	11%	389.5	-1.4%	1,950	11%	380.0	0.7%
2009	2,233	11%	400.7	2.8%	2,151	10%	393.9	3.6%
2010	2,413	8%	434.7	8.5%	2,336	9%	423.9	7.6%
2011	2,544	5%	454.6	4.6%	2,450	5%	445.9	5.2%
2012	2,739	8%	545.1	16.6%	2,640	8%	498.2	10.5%
2013	2,933	7%	516.6	5.2%	2,826	7%	492.3	-1.2%
2014	3,098	6%	549.8	6.4%	2,931	4%	508.3	3.15%
2015	3,219	4%	560.1	1.9%	3,097	6%	520.7	2.4%
2016	3,400	6%	579.3	3.4%	3,235	4%	534.1	2.6%
2017	3,716	9%	625.3	7.9%	3,399	5%	562.5	5.3%

Source; UETCL statistics

Daily load curve-Day of system peak in May 2018



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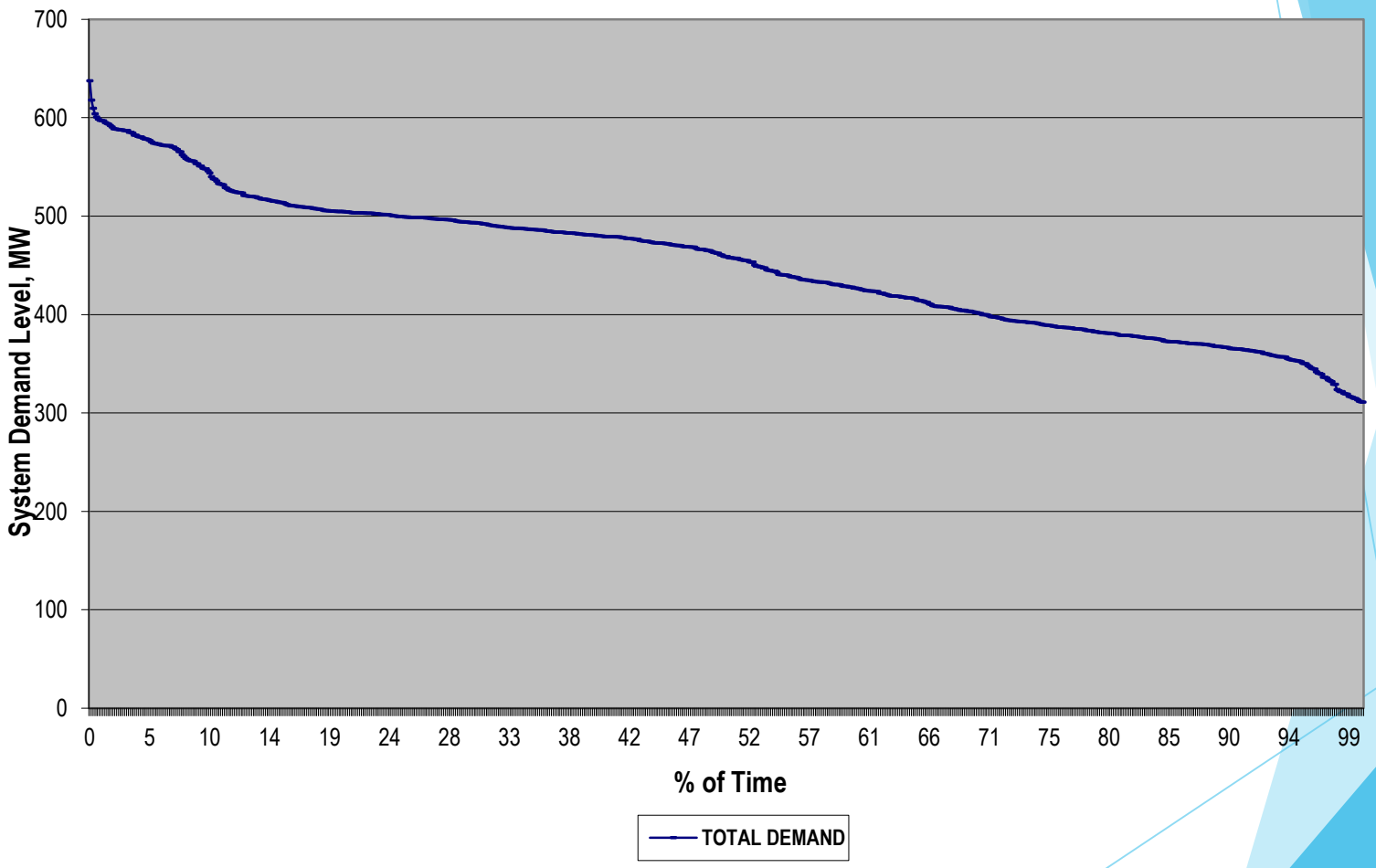
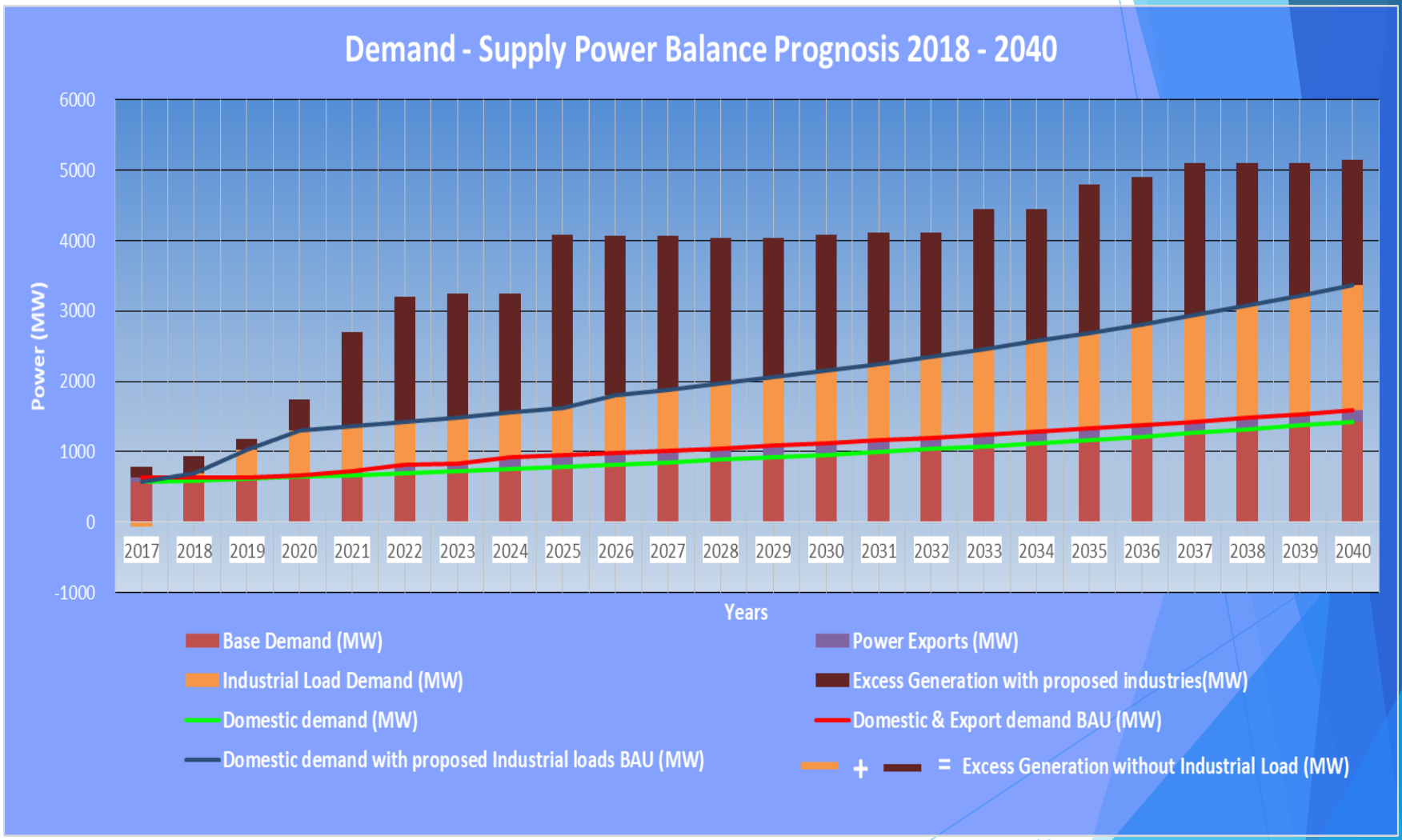
Load Duration Curve May 2018



Demand-Supply Balance Graphs



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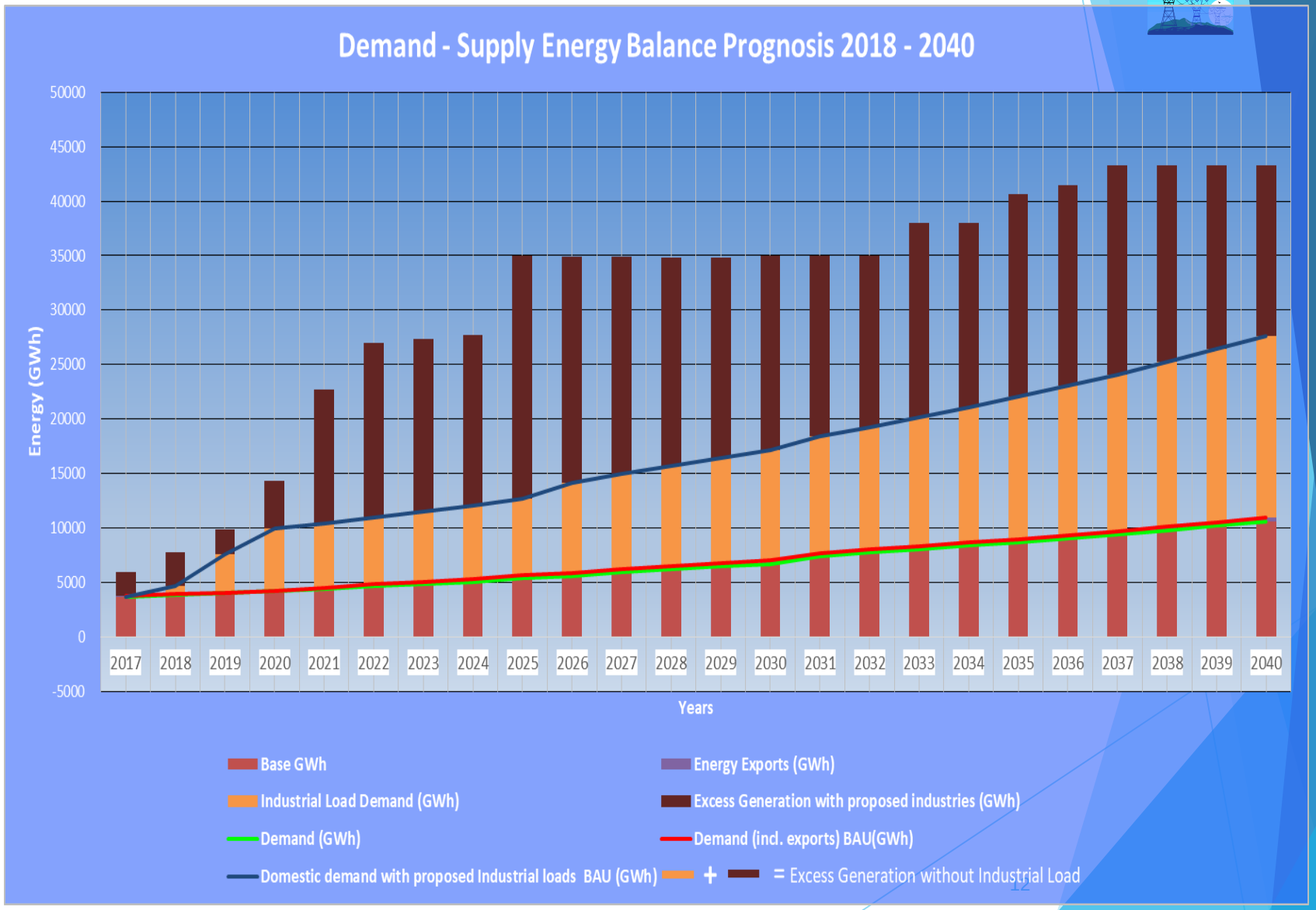
Demand-Supply Balance Graphs



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Deductions

Observation and Mitigation measures

- A deficit is observed in 2019 because of the anticipated industrial load however there is a surplus in case the industries do not materialize.
- Excess generation is envisaged throughout the planning horizon from 2020 to 2040 and can be utilized through:
  - Development of heavy Industrial loads.
  - Exportation to neighbouring countries e.g. Rwanda , DR Congo, South Sudan and Tanzania

Recommendations

- Demand growth opportunities need to be explored in order to realise demand that matches the generation capacity development.
- Hydro power generation plant development should be matched with demand growth outlook.

Note: Excess generation is envisaged throughout the planning horizon from 2020 to 2040, however in the event that the industrial loads do not materialize as envisaged, the quantity of surplus power will significantly increase and this will bear a financial burden on UETCL due to payment of deemed energy fees

UETCL's

Under UETCL's grid development plan are four categories of projects

- 1- Power evacuation projects
- 2- System reinforcement projects
- 3- System expansion projects
- 4- Regional integration projects

The projects in each of the categories will in one way or another contribute towards meeting the challenge of demand against supply through provision of new capacity or reinforcement of the grid.

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UETCL's Future Grid (Transmission Lines 2018 - 2040)

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Line Voltage (kV)	Line Length 2017 (km)	Line Length 2040 (km)	Additional Grid (km)
66	35.20	35.20	0
132	1,406.99	6,688.99	5282.00
220	260.00	2,939.84	2679.84
400	0	3,365.40	3365.40
TOTAL	**1,702.19**	**13,029.43**	**11,327.24**

UETCL's Future Grid (Substations 2018 - 2040)

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	2017	2040	Additional Grid
No. of Stations (Substations and Switching Stations)	18	73	55
Transformation Capacity (MVA)	1,640.5	18,870	17,229

Focus areas

High Voltage Transmission infrastructure

- Projects for power evacuation
- Power supply to industrial parks
- Regional integration projects

Single buyer business

- Execute PPAs with robust evacuation solutions

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Power Evacuation projects

No.	PROJECT	OBJECTIVE	CURRENT STATUS	FINANCIER
A	**POWER EVACUATION PROJECTS**			
1	Bujagali 220kV Switchyard Project (2X250MVA 220/132/33kV Power Transformers)	Evacuation of Power from Bujagali HPP	In Defects Liability Period	AfDB at EPC
2	Karuma Hydro Power & Interconnection Project	Evacuation of power from Karuma HPP and Supporting Rural electrification program	Under Construction	China EXIM Bank at EPC
3	220kV Nkenda - FortPortal - Hoima	Improvement of reliability and quality of supply in the western region of Uganda. Provision of transmission capacity to evacuate power from Kabaale 53MW Testcrude	Transmission line energized	Government of the Royal Kingdom of Norway and French Development Agency (AFD) at EPC

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Power Evacuation projects

No.	PROJECT	OBJECTIVE	CURRENT STATUS	FINANCIER
4	132kV 42km Isimba Interconnection Project	Provision of transmission capacity to evacuate power from Isimba HPP	Under Construction	China EXIM Bank at EPC
5	220kV Bujagali – Kawanda Line Bays	Provision of transmission capacity to evacuate power from Bujagali Substation	Under Construction	World Bank
6	Muzizi Interconnection substation:	Provision of transmission capacity to evacuate power from Muzizi SHPP	Sourcing for Financing for Implementation	Under Consideration for Funding Using EPC+F
7	Ayago Interconnection Project (to be packaged with HPP)	Provision of transmission capacity to evacuate power from Ayago HPP	At Feasibility Study/ Project Proposal Stage.	Under Consideration using EPC + F

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Power Evacuation projects

No.	PROJECT	OBJECTIVE	CURRENT STATUS	FINANCIER
8	37.3km 132kV Mirama-Kikagati-Nsongezi	Provision of transmission capacity to evacuate power	Sourcing for Funding for EPC	Under Consideration using EPC + F
9	83km 132kV Gulu-Agago TL Project	Provision of transmission capacity to evacuate power from Agago 83MW HPP	Feasibility Study Complete Procurement of EPC Contractor stage	To be funded by KFW
10	45km 220kV Hoima-Kinyara	Provision of transmission capacity to evacuate power	Sourcing for Financing for EPC	Under Consideration using EPC + F
11	74km 132kV Mbale – Bulambuli - Kapterol Transmission Line	Provision of transmission capacity to evacuate power from IPPs in Bulambuli area	Feasibility Study Ongoing	KFW at FS

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Power Evacuation projects

No.	PROJECT	OBJECTIVE	CURRENT STATUS	FINANCIER
12	Extension of Transmission Grid to Evacuate excess electricity generated from Tilenga and Kingfisher oil fields	Provision of transmission capacity to evacuate power from Tilenga and King Fisher Oil Fields	Sourcing for Financing for Feasibility Study and Implementation	Under Consideration using EPC + F
13	Nkenda Substation 132/33kV Upgrade (2X60MVA 132/33kV Transformers)	Increase Substation Capacity	Sourcing of Financing for Implementation	To Be Determined

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Power supply to large and industrial loads

No.	PROJECT	OBJECTIVE	CURRENT STATUS	FINANCIER
B	**Power supply to industrial loads**			
1	Tororo 80MVA, 132/33kV transformer	Improvement of reliability and power supply quality	Under Procurement	GOU
2	Kawanda substation upgrade (1X32/40MVA 132/33kV Transformer)	Provision of adequate capacity	Under Procurement	GOU
3	Kampala Metropolitan Area Improvement Project	Provision of adequate capacity, improvement of reliability	Procurement of Supervision Consultant ongoing	JICA at EPC
4	Grid reinforcement project: supply to Mbale, Rakai, Jinja, Mubende and Ishaka industrial substations and associated transmission lines	Provision of adequate capacity, improvement of reliability	Sourcing for Financing for Feasibility Study and EPC	To be financed by the Government of India

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Power supply to large and industrial loads

No.	PROJECT	OBJECTIVE	CURRENT STATUS	FINANCIER
B	**Power supply to industrial loads**			
5	Industrial Parks SS Project: Substations; 3X32/40MVA 132/33kV Luzira SS, 3X40/63 MVA 132/33kV Mukono SS, 2X32/40MVA 132/33kV Iganga SS, 3X40/63MVA 132/33kV; and associated transmission lines	Improvement of availability, reliability, and quality of power supply	Under Construction	China EXIM Bank at EPC
6	54km 132kV Kawanda - Kasana (1X20MVA 132/33kV Kawanda SS, 1X20MVA 132/33kV Kasana SS & 132kV Matugga Switching Station)	Improvement of availability, reliability, and quality of power supply	Sourcing for Financing for Feasibility Study and EPC	GOU
7	Sukulu Phosphate Transmission Line Project 2X50/63MVA 132/10.5kV Power Transformers – Phase 1; 2x125MVA, 220/10.5kV Power Transformers – Phase 2)	Improvement of availability, reliability, and quality of power supply	Sourcing for Financing for Feasibility Study and EPC	To be determined

Power supply to large and industrial loads

No.	PROJECT	OBJECTIVE	CURRENT STATUS	FINANCIER
B	**Power supply to industrial loads**			
8	T-Matugga - Kapeeka (Substations: 1X20MVA 132/33kV Kapeeka; Transmission Lines: 45km 132kV T-Matugga - Kasana)	Improvement of availability, reliability, and quality of power supply	Under Implementation	GOU
9	Nakasongola - Kaweweeta - Kapeeka 132kV transmission line and associated substations	Improvement of availability, reliability, and quality of power supply	Sourcing for Financing for Feasibility Study and EPC	Under Consideration using EPC + F
10	37km 220kV Wobulenzi - Kapeeka Transmission Line and associated substations	Improvement of availability, reliability, and quality of power supply	Sourcing for Financing for Feasibility Study and EPC	Under Consideration using EPC + F

Power supply to large and industrial loads

No.	PROJECT	OBJECTIVE	CURRENT STATUS	FINANCIER
B	**Power supply to industrial loads**			
11	Mbale Industrial and Business Park Substation (3X60/80MVA 132/33kV Transformers)	Improvement of availability, reliability, and quality of power supply to several industrial parks in Mbale	Sourcing for Financing for Feasibility Study and EPC	Under Consideration using EPC + F
12	Standard Gauge Railway Transmission Line Project (Substations: 2X10MVA 132/27.5kV Tororo, Buwoola, Iganga, Nyenga and Kampala East Traction Stations	Improvement of availability, reliability, and quality of power supply	Sourcing for Financing for Feasibility Study and EPC	Under Consideration using EPC + F

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Regional Interconnection Projects

No.	PROJECT	OBJECTIVE	CURRENT STATUS	FINANCIER
C	**Regional Interconnection Projects**			
1	220kV NELSAP (Bujagali - Tororo & Mbarara - Mirama)	Regional Power Trade	Under Construction	AfDB and JICA at EPC
2	Nkenda-Mpondwe (D.R.Congo) 220kV, 72.5km Uganda's side	Regional Power Trade	Sourcing for Financing	Under Consideration Using EPC + F
3	400kV Northern Corridor – Kenya/Uganda/Rwanda	Improvement of availability, reliability, and quality of power supply	Feasibility Study Complete. Sourcing for Financing for EPC	To be determined
4	82km 220kV Masaka - Mutukula - Mwanza Transmission Line	Regional Power Trade	Update of Feasibility Study through KfW financing On going	Update of FS by KFW EPC- Sourcing funds from KFW/AFD

Regional Interconnection Projects

No.	PROJECT	OBJECTIVE	CURRENT STATUS	FINANCIER
5	400kV Olwiyo-Nimule-Juba(Sudan)	Regional Power Trade	Sourcing for Financing for Feasibility Study from AfDB through NELSAP	To be determined
6	15km 132kV Arua - Aru TL Project	Regional Power Trade	Sourcing for Financing for Feasibility Study and EPC	To be determined

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Challenges

- Transmission projects are capital intensive and sometimes have challenges securing finances for the development of projects in a timely manner.
- Strained counterpart finances from the Government treasury.
- Project time overruns especially due to Right of Way acquisition challenges
- Transmission projects have long lead times:
  - Uncoordinated country plans. UETCL typically requires 5-7years to implement a project from inception to commissioning all factors constant. A request today from cannot translate into solution tomorrow.
- Maintaining a delicate balance between demand following supply or vice versa
- Unpredictable power exchange markets – every country is aggressively developing their own resources despite the regional strategy of sharing resources. Country energy security first??

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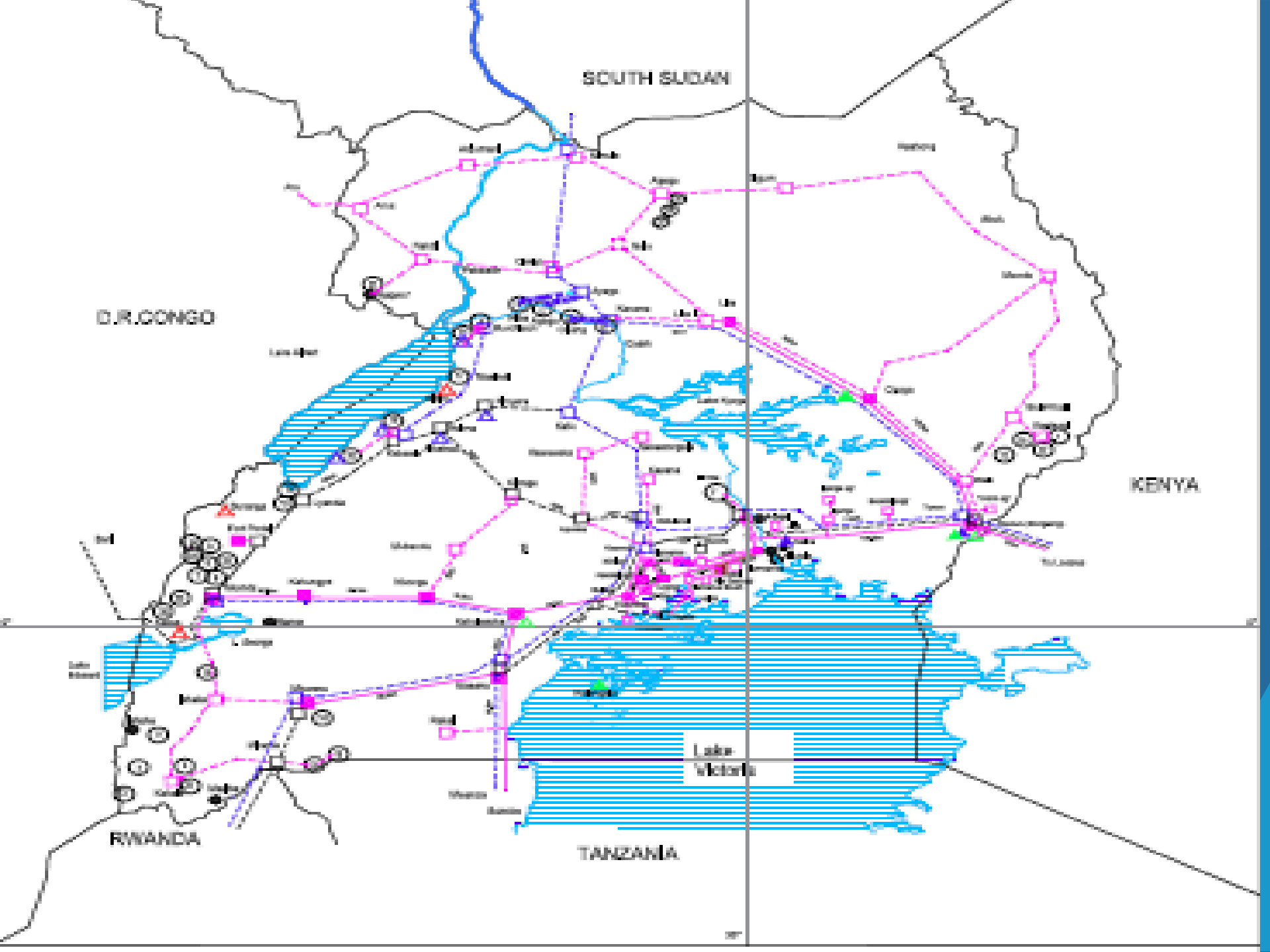
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Thank You for Your Attention !

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