EAPIC
East African Power Industry Convention

CLEAN POWER
EAST AFRICA

Building Collaboration Between East African Nations via Transmission Interconnectors

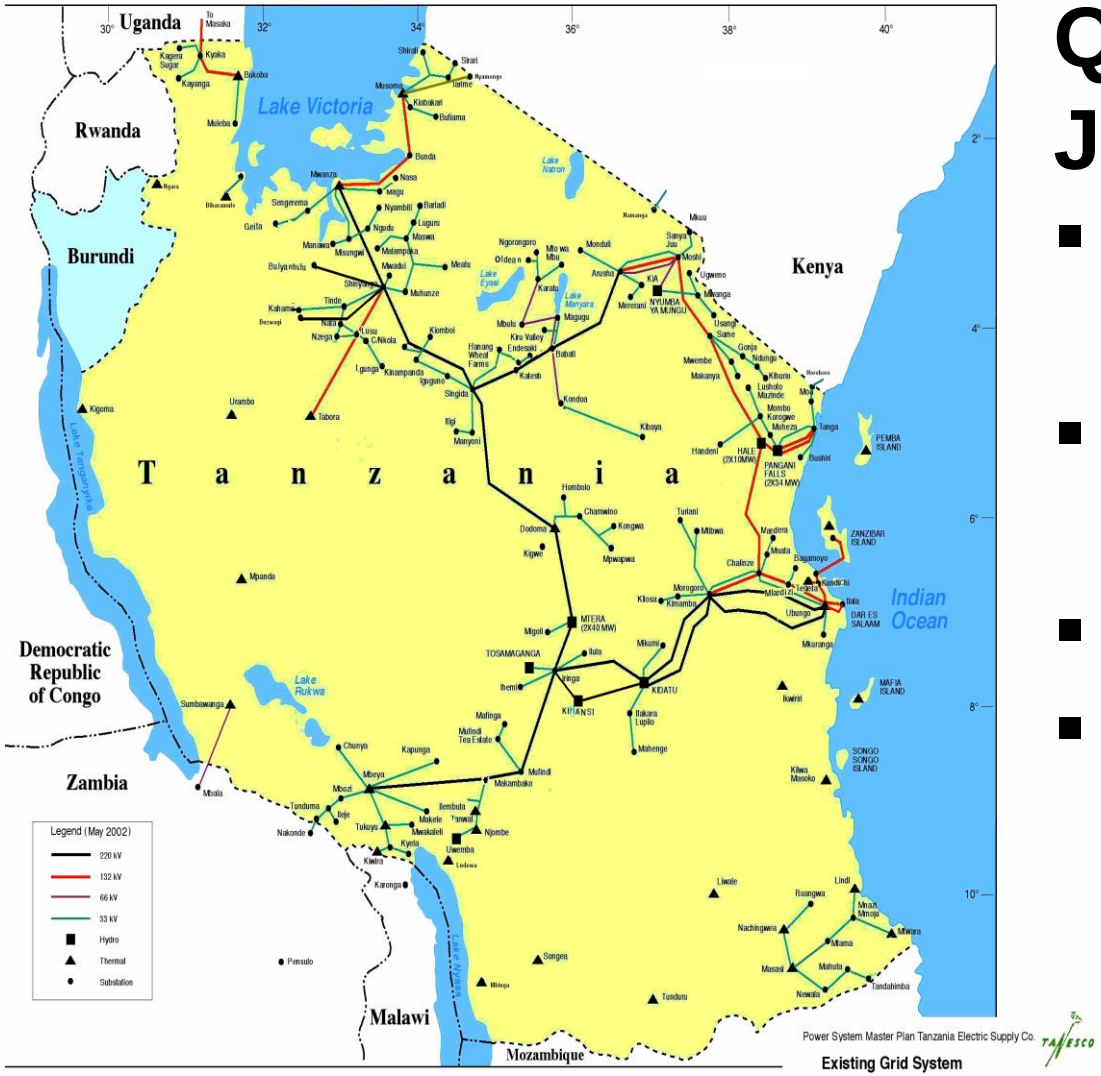
Eng. Christian M.A. Msyani

Ag. DEPUTY MANAGING DIRECTOR TRANSMISSION - TANESCO

CONTENTS

1. TANESCO - Existing Power System Overview
2. Challenges
3. Transmission Projects on Expansion, Refurbishment And Maintenance.
4. Transmission Interconnectors Enabling Regional Power Trade
5. Solution to Grid System Losses

1.TANESCO – Transmission System Overview

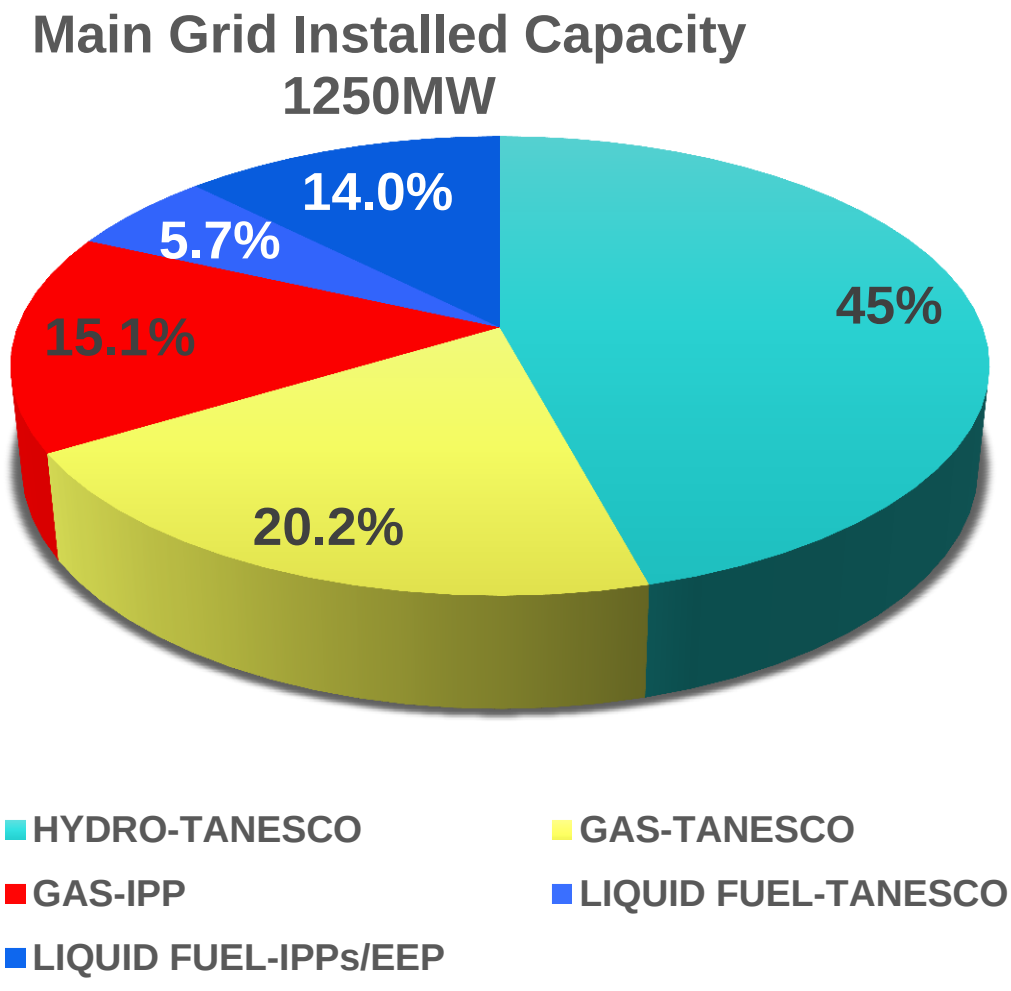


Quick Facts (By June 2015)

- Customer Base 1,501,162
- Access To Electricity 38%
- Connectivity: 28.7%
- Electricity Consumption : 101 kWh/Person

TANESCO - vertically integrated utility
100% owned by Government

Generation



Quick Facts:

Grid System Peak Load = 934.62MW (Dec 2014)

Isolated Min-grids Installed Capacity = 73.77MW

Import = 13MW

Annual Energy Demand (2014): 6,028.97GWh

Transmission

S/N	Transmission Asset Name	Voltage Level			Total
		220kv	132kv	66kv	
1	Transmission Line Route Length (km)	2,732.4	1,593.5	580.0	4,905.9
2	Circuit Segments (Nos.)	20	23	8	51
3	Transmission Losses (%)				6.12
4	Number Of Grid Substations	41	With Total Capacity		2,985 MVA
5	Optical Fiber Network Route Length (km)				2,025

Distribution System

- 15,165 km of 33kV and 5,687 km of 11kV Lines
- 40,822 km of LV (400V And 230V Lines).
- 12,340 Distribution Transformers
- Distribution Losses: 11%

2. CHALLENGES

S/N	Challenge	Mitigation
1.	High Energy Losses Due To Overloaded And Aging Transmission And Distribution System.	Execution Of New Projects On Distributed Generation (Natural Gas, Coal And Renewables), Transmission And Distribution.
2.	Unpredictable Hydrology Due To Global Environmental Changes	Execution Of Ongoing / New Projects On Generation To Improve The Generation Mix And Implement Projects On Regional Transmission Interconnectors

Challenge and Mitigation… cont'd

3.	Inadequate Reserve Margin	Execution Of New Projects On Generation; Implement Projects On Regional Transmission Interconnectors
4.	Vandalism Of Transmission And Distribution Infrastructure And Power Theft.	Reinforcement Of Security Of Our Infrastructure Through Involvement Of Local Communities, Use Of Aluminum Cables Instead Of Copper And Enhancement Of Revenue Protection Measures.

5.	High Cost Of Generation	Invest In Cheaper Sources Of Generation; Grid Extension To Off-grid Areas And Implement Projects On Regional Transmission Interconnectors
6.	High Costs Of Compensation For Land Acquisition	Review Way-leave Standards And Tower Engineering Design And Utilization Of Existing Way-leaves.
7.	Inadequate of voltage compensation equipment	Execution of new projects on Transmission system

3. TRANSMISSION PROJECTS ON EXPANSION, REFURBISHMENT AND MAINTENANCE

- **Objectives: To Improve The Performance Of The System in System Availability; Reliability; Service Quality and Efficiency**

- **Some of Transmission System KPIs:**

S/N	KPI	Case 2014
1.	Transmission system losses, % of net unit generated, %	6.12

Some of Transmission System KPIs…

S/N	KPI	Case 2014
2.	Energy Not Supplied (ENS) Due To Faults On Transmission System, MWh (< 156MWh)	4448.1
	Transmission System Minutes, Minutes (<10min)	305.6
3.	System Average Interruption Frequency Index (SAIFI) – CP	10.25
4.	Transmission System Availability Factor (%)	95.87

Transmission Projects

Objective: Improve power availability, reliability and service quality / efficiency"

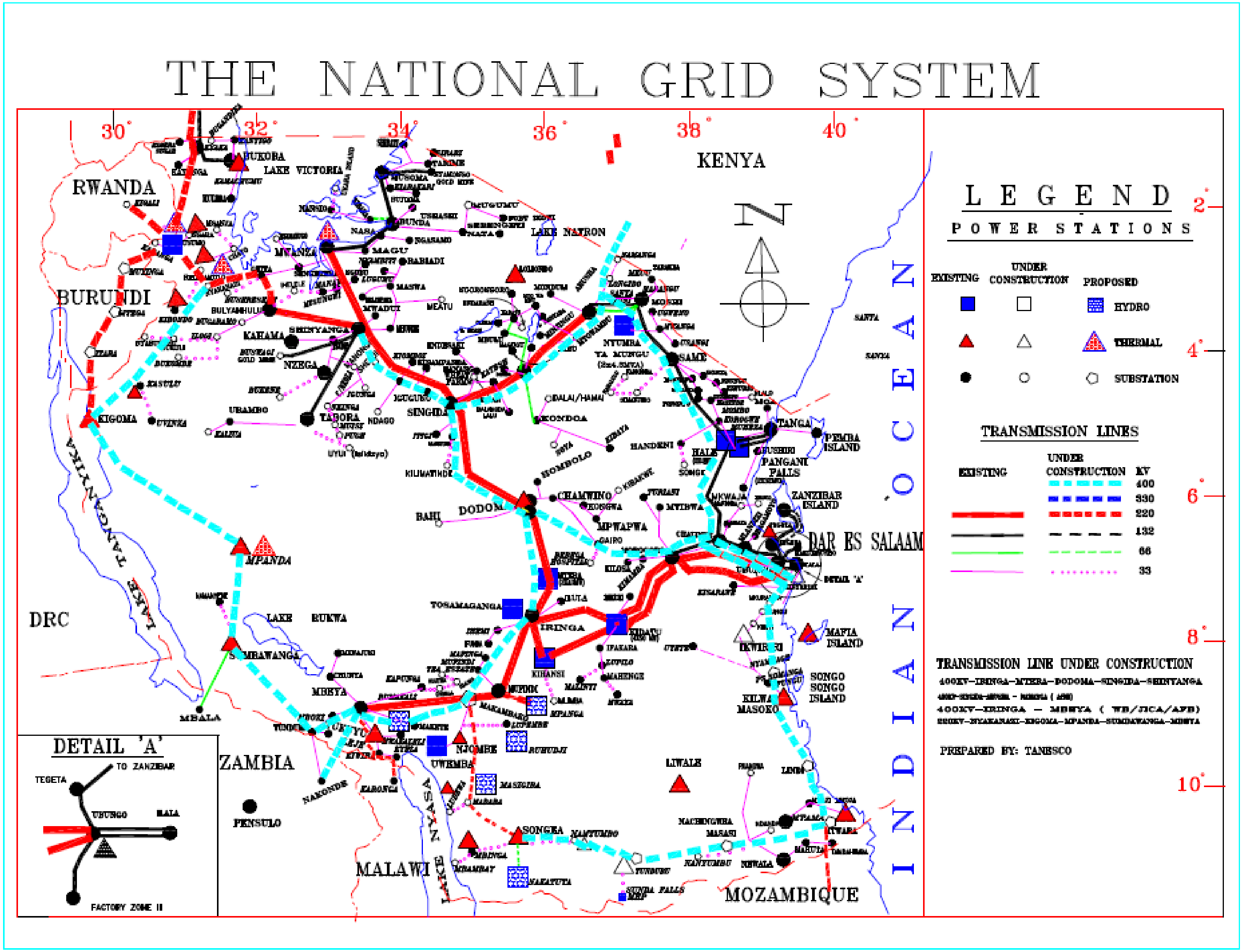
S/No	Project Description	Financing	Completion Date
1	400kV Iringa – Shinyanga Transmission Project (Backbone)	Available	June 2016
2	400kV North East Grid Dar – Chalinze – Tanga - Arusha	Available	2017
3	200kV Makambako – Songea Transmission Line	Available	2017
4	400 kV Singida - Arusha Transmission Line	Available	2018

Transmission Projects

Objective: Improve power availability, reliability and service quality / efficiency”

S/No	Project Description	Financing	Completion Date
7	220 kV Bulyanhulu-Geita Transmission Line	Available	2017
8	220kV T/L Geita – Nyakanazi Transmission Line	Available	2017
9	Rehabilitation And Upgrade Of Grid Network.	Available	2018

Future Grid Map By 2035



4. TRANSMISSION INTERCONNECTORS ENABLING REGIONAL POWER TRADE

- **Diversified Power Resources In East Africa:**
  - **Renewable Resources: Geothermal, Wind, Bio/Solar, And LNG**
  - **Hydro**
  - **Coal**
- **Benefits Of Power Interconnections:**
  - **Exchange Power At The Most Economic Costs In The Region**
  - **Improved Reliability And Security Of Power Supply In The Region**

Transmission Interconnectors Enabling Regional Power Trade…cont'd

- **Benefits Of Power Interconnections …**

- **Meet Power Demand In The Region By Providing Transmission Capacity -Will Reduce Investment Cost Due To Improved Energy Utilization**
- **The HVAC Interconnectors Will Facilitate Increase Of Access To Electricity And Contribute To Poverty Alleviation In Rural Communities Along The Project Route**

Transmission interconnectors enabling Regional Power Trade…Cont'd

Identified Transmission Interconnectors Projects		
SN	**Interconnector**	**Capacity (MW)**
1	Kenya – Tanzania, 400kV (507.5km)	200
2	Uganda/Masaka – Tanzania/Mwanza,220kV (335km)	100
3	Tanzania – Burundi, Tanzania - Rwanda – (Rusumo Project), 220kV	22
4	Tanzania/Mwanza – Kenya/Kisumo, 220kV	100
5	Tanzania – Burundi (Through Kigoma), 220kV	100

5. SOLUTION TO GRID SYSTEM LOSSES

⊙Technical Losses

- **New 400kv Expansion Projects On Progress To Meet Growing Demand And Relieve Overloaded Lines.**
- **Rehabilitation Of 220kv T/Lines – Insulator Hardware Replacement And Grounding Improvement On Track.**
- **Grid Substations Rehabilitation And Upgrades Projects On Progress.**

Solution To Grid System Losses… cont'd

- Reinforcement of Transmission and Distribution Facilities Projects in the Country
- Maintenance and Repair of SVCs and FSC
- Installation of AMR / SMART Meters in Distribution System
- Enhanced Revenue Protection Measures

THANK YOU…