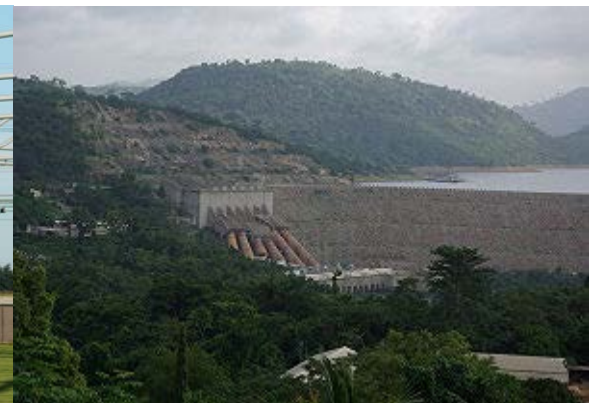




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Generation System

- Demand Outlook
- Existing Generation Resources

Transmission System

- National Interconnected Transmission System
- State of the Transmission Grid
- Transmission Losses
- Strategies to reduce Transmission losses

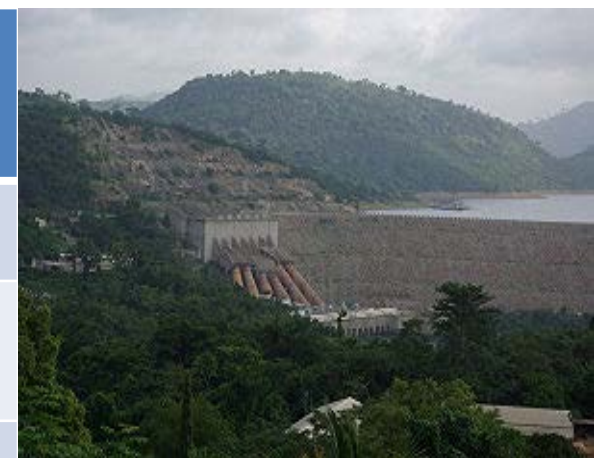
Distribution System

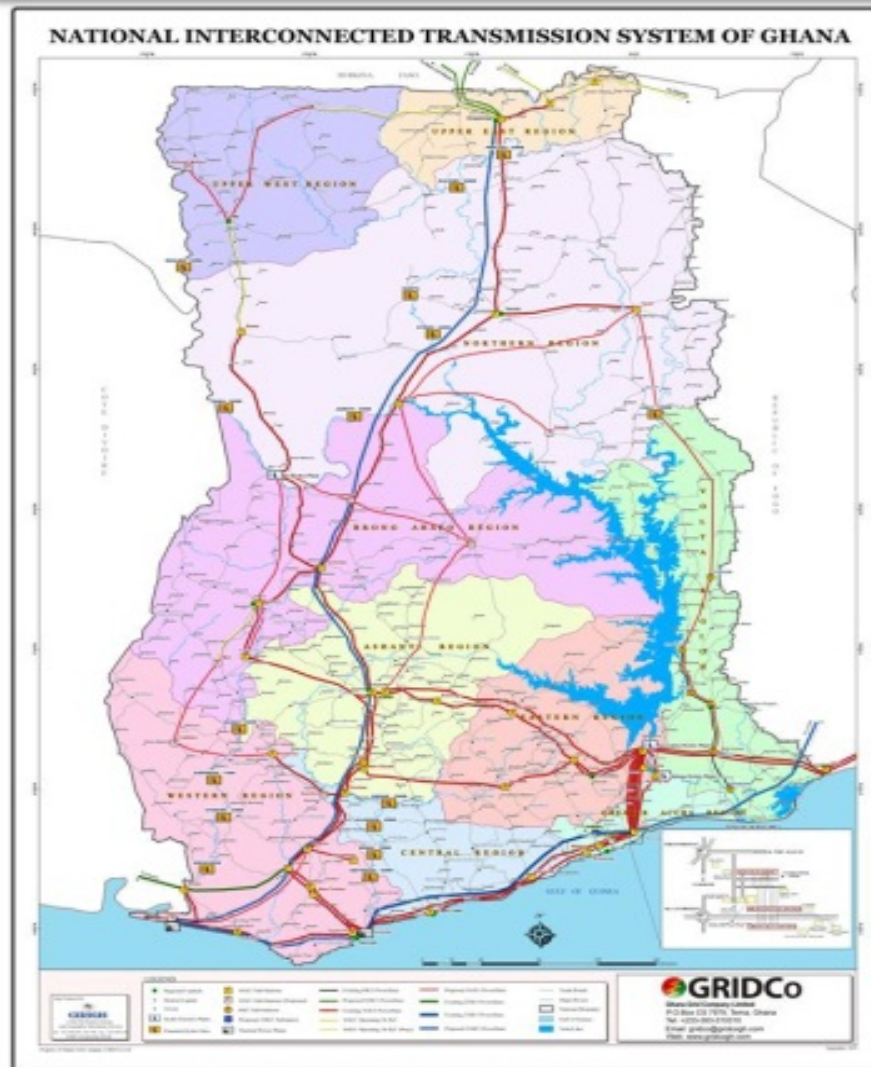
- Existing Distribution Utilities
- Distribution System Losses
- Strategies to reduce system losses
- Expected Benefits of loss reduction strategies

Demand Outlook

- Over the long term (2011 – 2021) demand is projected to grow at an average of about 6.9%.
- VALCO demand is assumed to be at 2 pot lines from mid 2012 to 2021
- Energy consumption is projected to increase from 11,337 GWh in 2011 to 23,236 GWh in 2021
- Demand is projected to grow from 1,677 MW in 2011 to 3,264 MW in 2021.

Plant	Installed capacity	Fuel Type
Akosombo and Kpong GS	1180	Water
Takoradi International Company(TICO)-VRA	330	LCO/Gas
Takoradi Power Company(TAPCO) - IPP/VRA	220	LCO/Gas
Tema Thermal 1 Power Plant - VRA	110	LCO/Gas
Mines Reserve Plant - VRA	80	Diesel
Tema Thermal 2 Power Plant - VRA	49.5	Gas
Sunon-Asogli Power Plant (SAPP)-IPP	200	Gas
Total	2169.5	





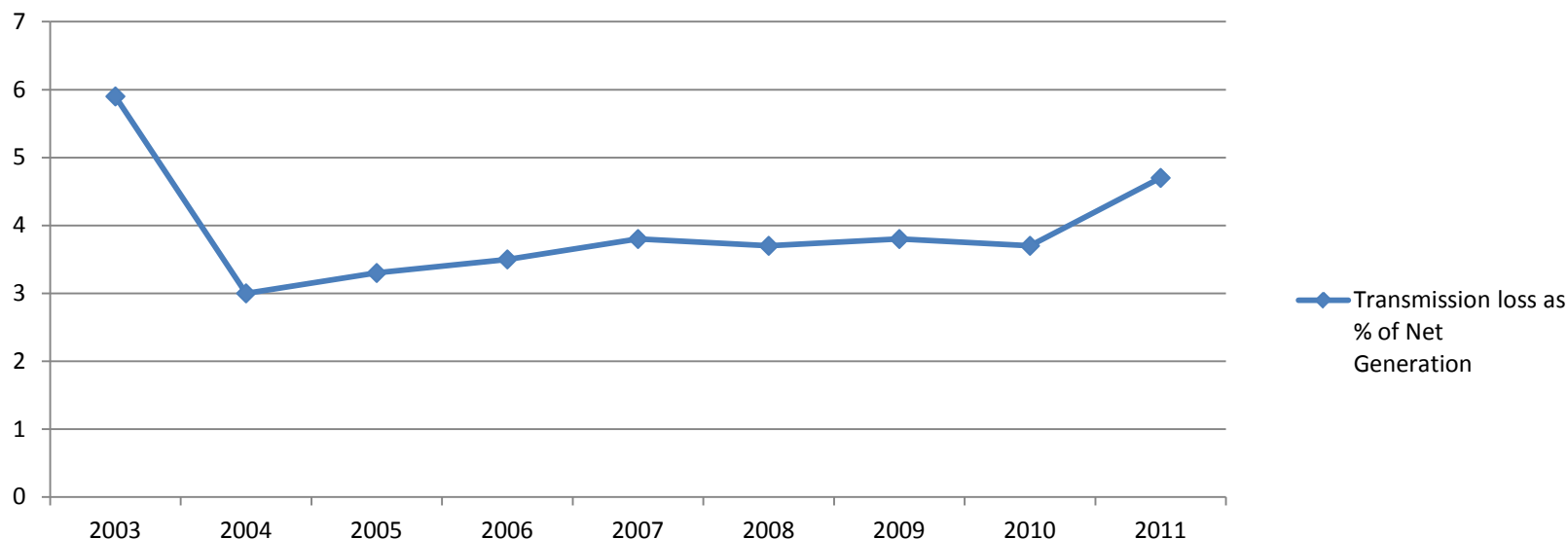
System Operation & Performance

- Inadequate generation capacity – resulting sometimes into load-shedding
- Low system voltages due to inadequate reactive power support and over-loaded lines and transformers
- Higher than PURC Standard of 3.5% losses
- System in 'alert' state rather than 'normal' state and cannot support the N-1 reliability criteria

Statistics of Transmission Losses

	2003	2004	2005	2006	2007	2008	2009	2010	2011
Transmission loss as % of Net Generation	5.9	3.0	3.3	3.5	3.8	3.7	3.8	3.7	4.7

Transmission loss as % of Net Generation



Road Map to address System Challenges

The following Documents have been developed:

- Transmission Systems Master Plan Study for Ghana (2010-2020)
- Generation Systems Master Plan Study for Ghana (2010-2025)
- Annual Reliability Assessment Studies (2010 and 2011)
- Protection Review Study

Projects to address critical system challenges

- Substations Upgrade Project
- Capacitor Banks Project
- Accra-Tema 4th Circuit and Volta-Tema Lines Upgrade
- Transmission Lines Upgrade projects

System Rehabilitation Projects

- Substations Reliability Enhancement Project
- Replacement of MV Indoor Equipment

Existing Distribution Utilities

- Electricity Company of Ghana
- Northern Electricity Distribution Company
- Enclave Power Company



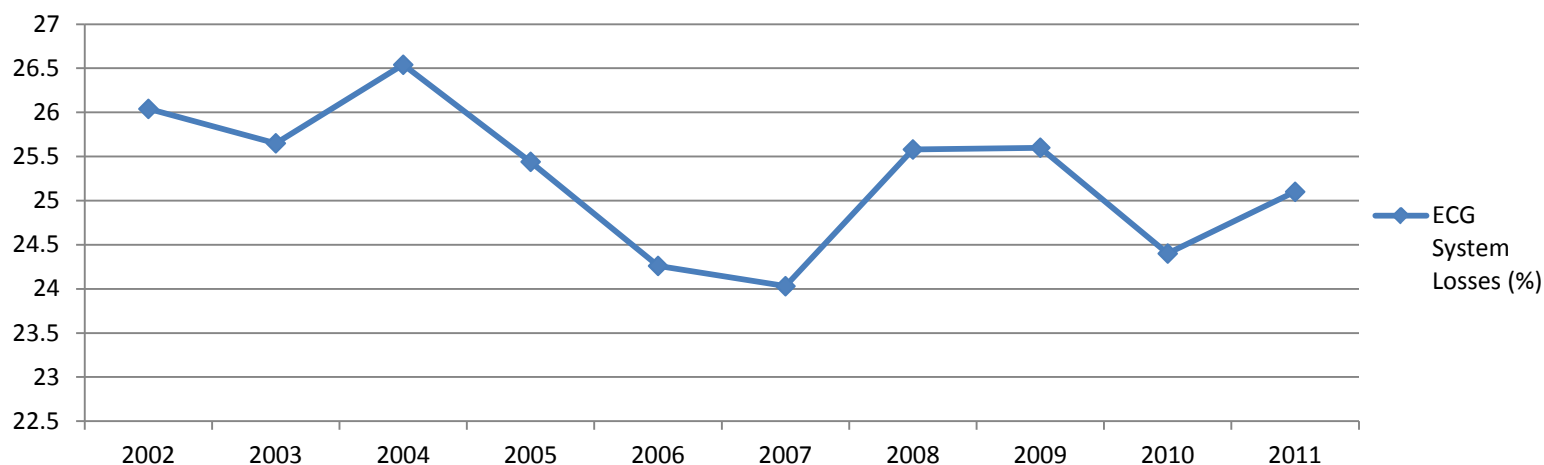
Electricity Company of Ghana

- The Electricity Company of Ghana (ECG) Networks cover the six (6) southern regions of Ghana except for the Free Zone area in Tema.
- The Networks comprise about 14,177 circuit km of 33 kV network, 15,521 circuit km of 11 kV distribution network and approximately 1,458,355 km of LV Distribution network (O/H and U/G cables).
- ECG receives power from the national transmission grid through twenty six (26) Bulk Supply Points (BSPs).
- From these BSPs, power distribution is done through ninety eight (98) primary (33/11kV) substations and about nine thousand (9550) secondary (33/0.4kV and 11/0.4kV) substations.

Historical Record of ECG Losses

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
ECG System Losses (%)	26.04	25.65	26.54	25.44	24.26	24.03	25.58	25.6	24.4	25.1

ECG System Losses (%)



Causes of ECG Commercial Losses

The causes of the commercial losses have been identified to be due to

- illegal connections,
- metering problems,
- billing challenges, and
- collection challenges

Causes of ECG Technical Losses

The technical losses are caused mainly by

- inadequate equipment capacity
- old and obsolete cables.

2011 ECG Losses Statistics

	1st Quarter 2011	2nd Quarter 2011	3rd Quarter 2011	4th Quarter 2011
Technical Distribution Losses (%)	12	15	15	15
Commercial Distribution Losses(%)	9.34	15.37	7.03	15.11
Distribution System Losses(%)	21.34	30.37	22.03	30.11

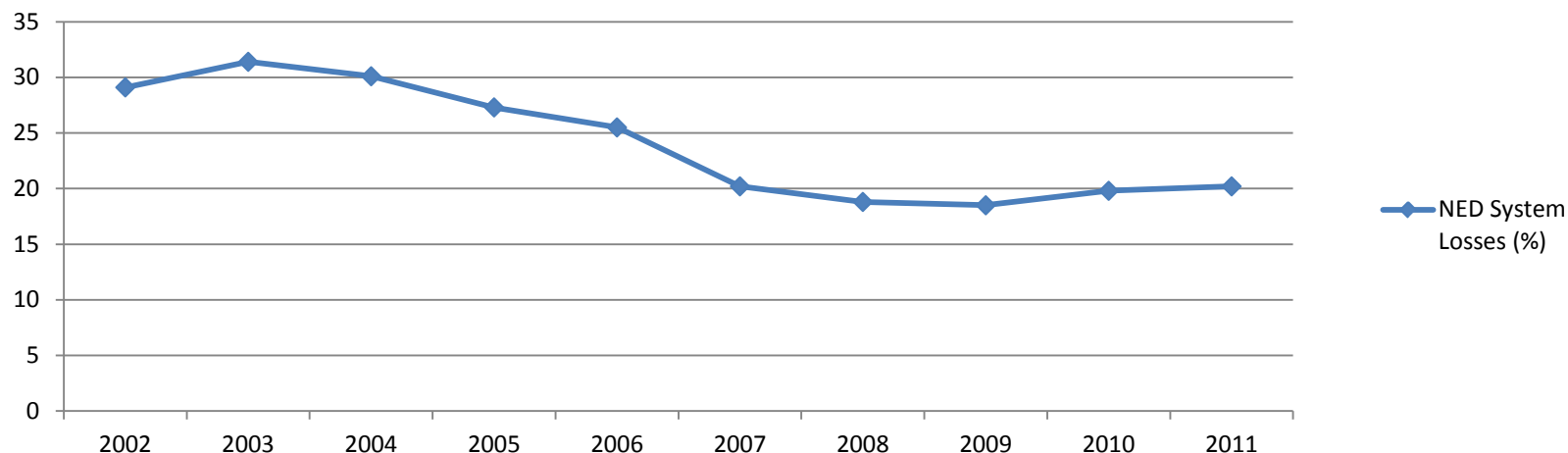
Northern Electricity Distribution Company

- Northern Electricity Distribution Company (NEDCo) operations cover largely the northern part of Ghana comprising the Brong-Ahafo, Northern, Upper East and Upper West regions.
- The Distribution network consists of 5,488 km of medium voltage lines and 7,832 km of low voltage (415V) lines connecting 24 Bulk Supply Points (BSPs).
- The NEDCo system has transformer installed capacity of 200 MVA compared to its average peak load of 130 MVA.

Historical Record of NEDCo's Losses

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
NED System Losses (%)	29.10	31.40	30.10	27.3	25.5	20.20	18.8	18.5	19.8	20.2

NED System Losses (%)





The major challenges facing NED are:

- Long networks serving low customer population density communities;
- illegal connections,
- metering problems,
- billing challenges, and
- collection challenges

Commercial Loss Reduction

- Re-routing of concealed service tails and the use of meter enclosures to secure meters
- Deployment of consultants to monitor service connections of the 10,000 largest customers
- Strengthening of the Loss Control Unit to monitor energy consumption of customers areas
- Establishment of utility courts to prosecute energy theft
- Automation of Commercial Management Systems
- Installation of remote meter reading and meter database management systems
- Use of smart metering technologies/ applications

Technical loss reduction

- Pilot Implementation of High Voltage Distribution System (HVDS)
- Shunt Capacitor Compensation at substations and on feeders across operational areas
- Reconstruction of the Low Voltage (LV) network using aerial bundled conductors
- Construction of additional primary substations to reduce transmission over long lines which results in line losses

Execution of the listed strategies are expected to:

- Reduce system losses to regulated levels of 21% set by the PURC;
- Improve voltage levels to achieve $230V \pm 10\%$;
- Make available additional active power to meet customer demand
- Relieve the existing network of excessive overloading
- Reduce investment into generation as demand is relatively reduced
- Reduce investment into distribution network upgrade
- Reduce outage levels to achieve regulated levels of 48hours per customer per year as set in the Legislative Instrument 1816, Electricity Supply And Distribution(Technical and Operational) Rules, 2005.

