

WEC AFRICA REGIONAL WORKSHOP ON ENERGY
EFFICIENCY, ADDIS ABABA, 29-30 JUNE 2009

ENERGY EFFICIENCY IN KENYA

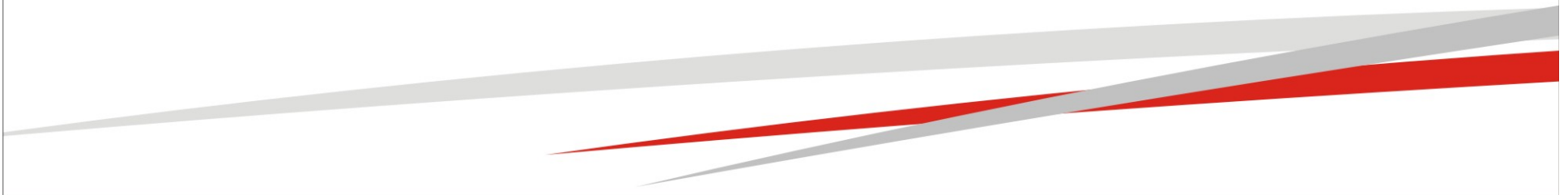
By

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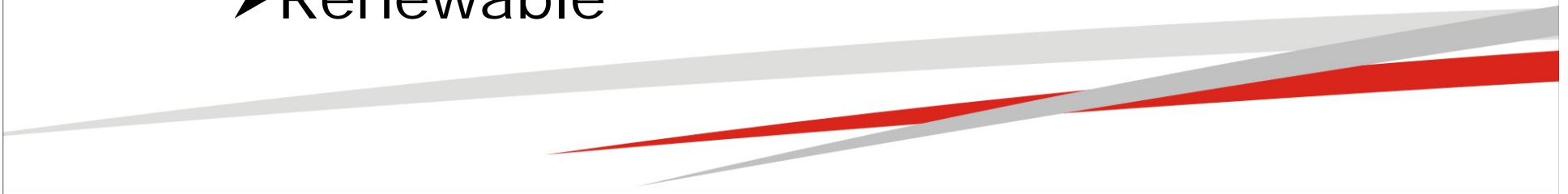
Presentation Outline

- Overview of Kenya's Energy Sector
- Government Policy on Energy Efficiency
- Supply Side Energy Efficiency in Power Sub-sector
- Demand Side Energy Efficiency Initiatives
- Conclusions




Overview of Kenya's Energy Sector - 1

- The Energy Sector is under the oversight of the Ministry of Energy (MOE)
- The sector has the following sub-sectors:
 - Power (Electricity)
 - Fossil Fuels
 - Biomass
 - Renewable



Overview of Kenya's Energy Sector - 2

- Kenya's energy supply mix consists of:
 - Biomass - 68%
 - Petroleum - 22%
 - Electricity - 9%
 - Others (Coal and coke) - 1%
 - High dependency on biomass a big challenge -environmental degradation
 - Volatility of oil prices impacting negatively on many sectors
 - Electricity access low, at about 18%
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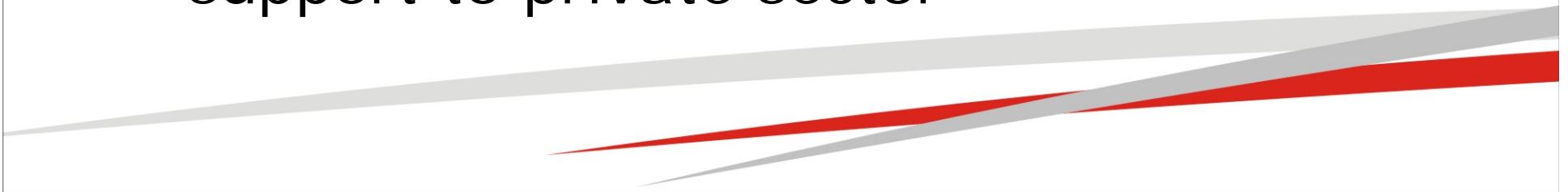
Overview of Kenya's Energy Sector – Power System Key Data

- Intercon. generation capacity - 1331 MW
- Effective Generation Capacity - 1289 MW
- Recorded Peak Demand - 1072 MW
- Estimated unsuppressed demand - 1172 MW
- Annual Consumption - 6385 GWh
- Total System Losses (2007/08) - 16.6%
- Number of Customers - 1.3million
- Access to electricity - 18%

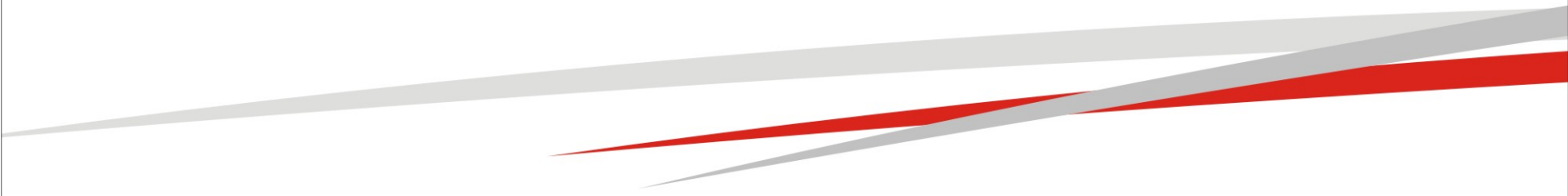


Govt. Policy on Energy Efficiency

- Sessional Paper No. 4 of 2004 on Energy aims at promoting energy efficiency (EE) to:
 - Reduce forex costs of oil imports
 - Defer additional investment in power generation
- Govt proposes to promote EE technologies and measures by:
 - Providing technical and financial support to private sector

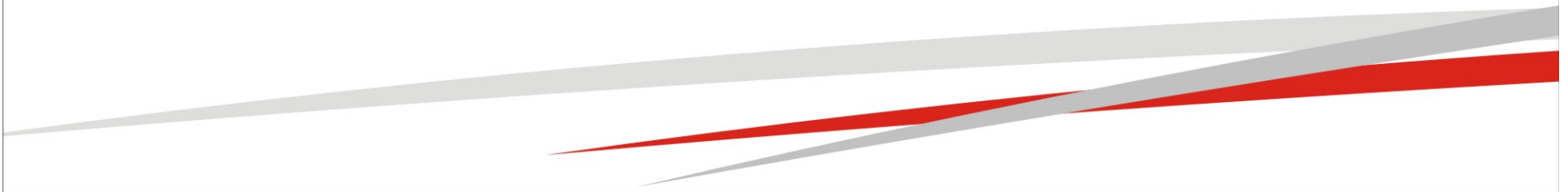


Policy on Energy Efficiency - 2

- Enhancing provision of energy audits and advisory services by MOE to companies and institutions
 - Establishing equipment testing laboratories for efficiency
 - Promoting cost-effective industrial energy efficiency and conservation (EE&C) measures
 - Encouraging DSM by industrial and commercial sectors
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Policy on Energy Efficiency - 3

- Disseminating EE&C information to consumers
- Developing standards and codes of practice on cost-effective energy use
- Establishing a “centre of excellence” for EE&C at national level
 - ✓ Centre to guide and promote development and implementation of EE technologies and methods




Policy on Energy Efficiency - 4

- Sector-specific strategies: - **Transport:**
 - Continue use of tax on fuel to choke-off wasteful consumption of motor fuels, especially petrol
 - Develop and enforce standards for fuel efficiency of motor vehicle engines and enforce speed limits
 - Encourage, where appropriate, other transportation options with economies of scale
 - Provide information on cost effective fuel efficiency standards & practices

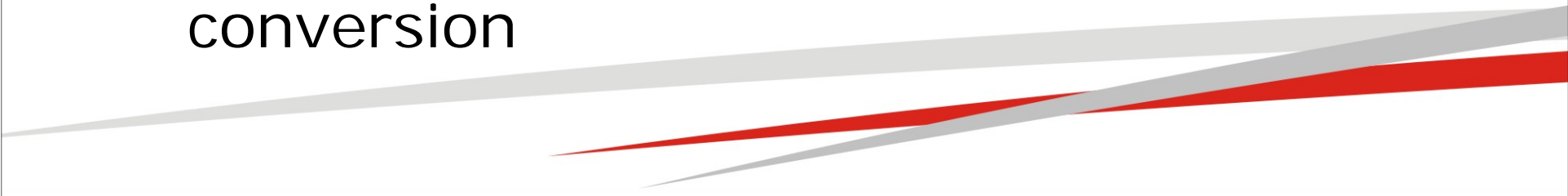
Policy on Energy Efficiency - 5

- Sector-specific strategies: - **Industrial and Commercial:**
 - Provide, where feasible, appropriate fiscal and other incentives to improve efficiency of motors, kilns, boilers, and heat & energy transfer systems
 - Provide technical assistance in energy auditing
 - Assist in establishment of energy management training programmes
 - Undertake demonstration projects in energy efficiency and conservation

Policy on Energy Efficiency - 6

- Sector-specific strategies: - **Large office buildings, Hotels, Schools & Hospitals:**
 - Require new buildings to incorporate energy efficiency and conservation (EE&C) features and encourage existing buildings to retrofit
 - Enforce use of solar water heating and natural ventilation in new buildings where technically feasible
 - Amend building by-laws to require new bldgs to incorporate EE&C
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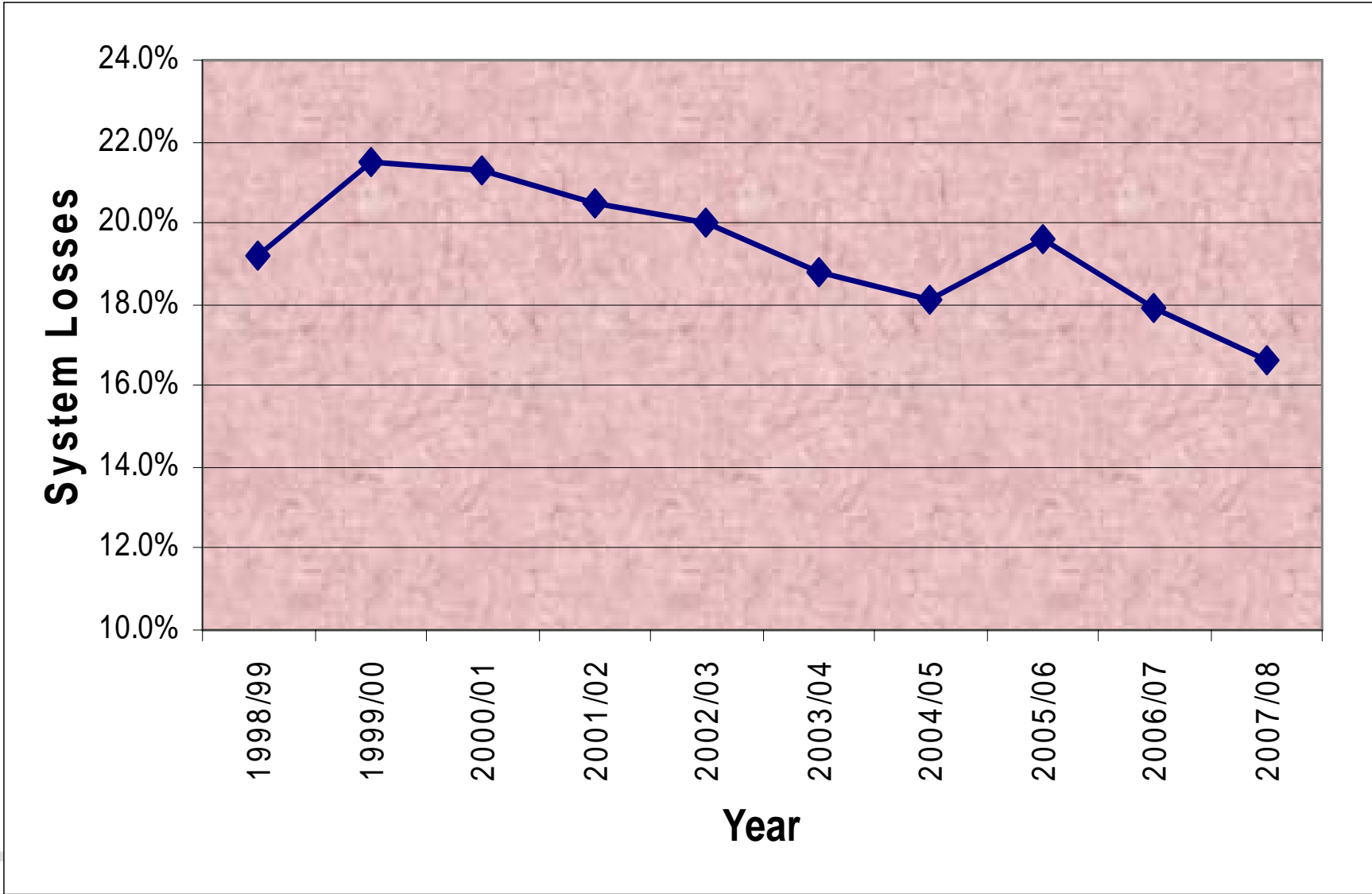
Policy on Energy Efficiency - 7

- **Supply Side Energy Efficiency and Conservation:**
 - Govt to continue promoting and encouraging efficiency in extraction, conversion, transportation and distribution of energy in cost-effective manner
 - Critical areas of focus will continue to be oil refining, electricity generation and biomass extraction and conversion
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Supply Side Energy Efficiency in Kenyan Power Sub-sector - 1

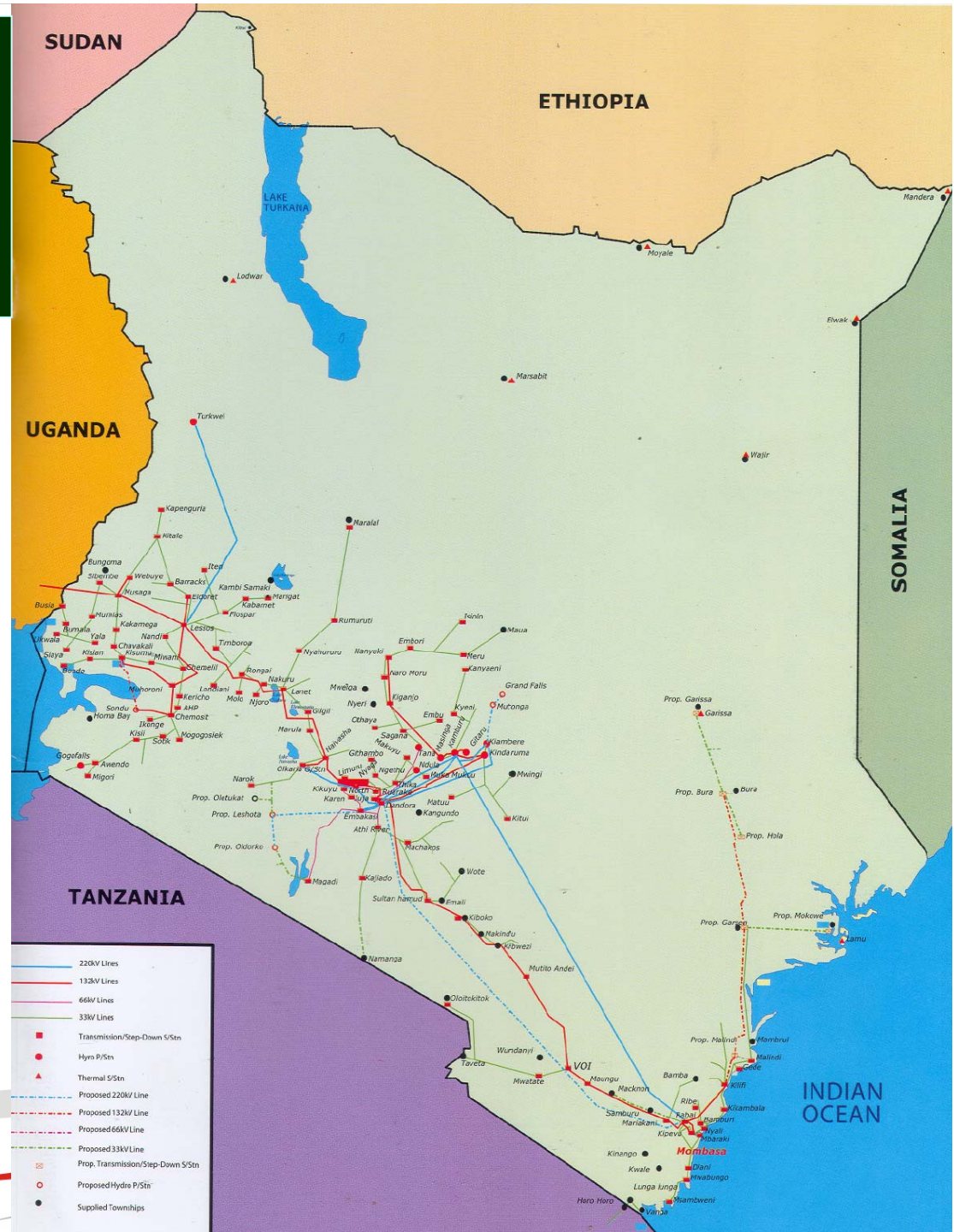
- Specific fuel consumption nos. in PPAs
- Total power system transmission and distribution losses have progressively decreased from a high of 21.5% in 1999/2000 to 16.6% in 2007/08.
- About 70% of energy is consumed at LV (240/415V) and 30% at 11kV-132kV
- In formulae in KPLC tariff for recovery of fuel and forex costs, Loss Factor is 16.9% but to decrease by 0.5%/yr. For several yrs up to 2008/09 it was 15%.
- This gives incentive for loss reduction

Total System Losses Declining




Existing Network


Voltage (kV)	Length (km)
220	1,323
132	2,085
66	632
33	12,633
11	23,602
Total	40,274




Supply Side Energy Efficiency in Kenyan Power Sub-sector - 2

- Main factors that contribute to increase in system losses:
 - Overstretched and overloaded distribution network
 - High tariffs compared to those before August 1999 and high fuel costs, which are passed through to customers, leading to increased theft
 - Large component of demand supplied at low voltage
 - Nature of human settlement – in individual farms, compared to villages
- 

Supply Side Energy Efficiency in Kenyan Power Sub-sector - 3

- Main factors that contribute to increase in system losses contd:
 - Mismatch between power demand and capacity of step-down transformers supplying it:
 - ✓ 3MVA+ of tx capacity per MW of demand
 - ✓ Leads to inordinately high tx iron losses
 - Long LV circuits, some of very thin conductors
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Supply Side Energy Efficiency in Kenyan Power Sub-sector - 4

- Main Strategies taken or planned to reduce system losses:
 - Re-conductoring of 11kV feeders
 - Upgrading overloaded substations
 - Establishing additional 66/11kV and 33/11kV substations
 - Installation of capacitors
 - Intensification of anti-fraud initiatives
 - Replacement of electro-mechanical meters with electronic ones
 - Replacement of faulty meters
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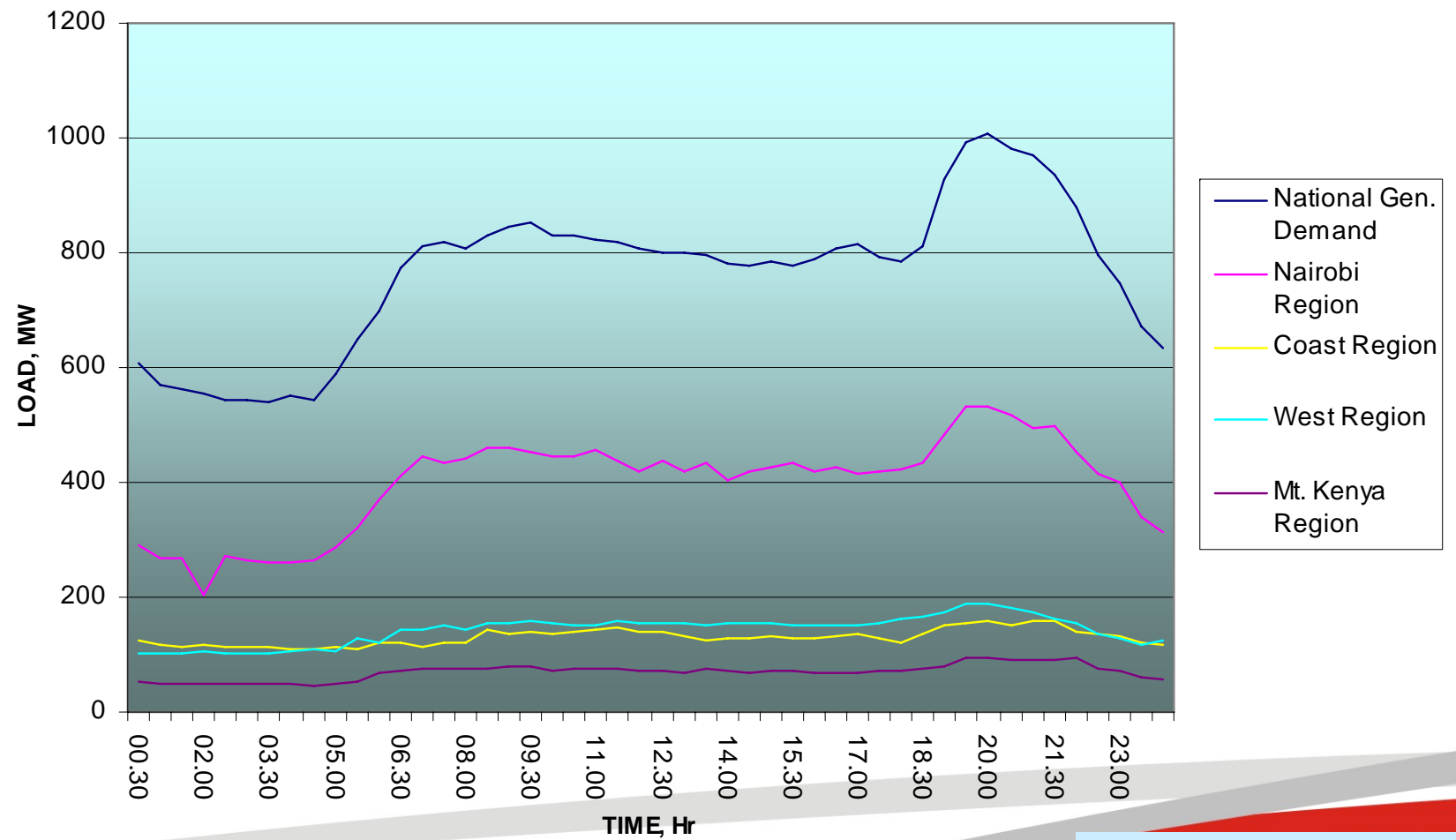
Supply Side Energy Efficiency in Kenyan Power Sub-sector - 5

- Main Strategies taken or planned to reduce system losses contd:
 - Use of single phase transformers close to customers' premises – reduce iron losses and shorten LV circuits, besides reducing tx vandalism
 - Sensitising customers on EE&C measures
 - Use of split-metering prepayment system
 - Building a 132 kV backbone for rural electrification and cross-border electrification of some isolated grids

Supply Side Energy Efficiency in Kenyan Power Sub-sector - 6


- Main Strategies taken or planned to reduce system losses contd:
 - Cost reflective tariffs – LRMC-based basic rates + fuel cost charge + forex adjustment + low p.f. surcharge:
 - Change from incandescent bulbs to CFLs by some customers
 - Heating water with solar thermal heaters
 - Switching off some security lights
 - Feed-in tariffs for renewable energy sources – capacity closer to loads

Typical Load Curve




Demand Side Energy Efficiency Initiatives - 1

GEF-KAM Industrial Energy Efficiency Project

- Govt of Kenya undertaking funded by Global Environment Facility (GEF) and UNDP
 - Implemented through Kenya Association of Manufacturers (KAM)
 - In 2001-2006 assisted private enterprises to reduce energy costs through increased EE&C
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Demand Side Energy Efficiency Initiatives - 2

GEF-KAM Industrial Energy Efficiency Project contd:

- By end of 2006 assisted industry to save over US\$36m in energy costs and avoid 530,000 tonnes of CO2 emissions
 - Some industries saved up to 30% of energy consumption
 - Realized following other achievements:
 - Trained 1000+ personnel from over 40 companies in energy management
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Demand Side Energy Efficiency Initiatives - 3

GEF-KAM Industrial Energy Efficiency Project contd:

- Initiated the Energy Management Award (EMA) to recognize industries that have embraced EE and realized energy and cost savings
- Mobilized resources from Govt to establish a Centre for Energy Efficiency and Conservation (CEEC)
 - ✓ Govt through MOE provides a grant of KShs. 20m annually (US\$256,000) to support the CEEC and EMA.

Demand Side Energy Efficiency Initiatives - 4

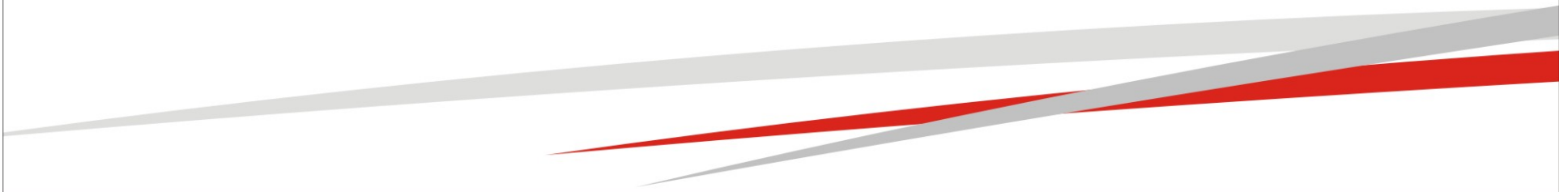
GEF-KAM Industrial Energy Efficiency Project contd:

- ✓ The EMA is also sponsored by power sector organizations: Utilities, manufacturers and regulator
 - Developed Post Graduate and Diploma courses at tertiary institutions
 - Created the Kenya Industrial Energy Efficiency Network, with 8 sectors that share information on EE&C
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Demand Side Energy Efficiency Initiatives - 5

GEF-KAM Industrial Energy Efficiency Project contd:

- Facilitated establishment of the first Energy Service Company (ESCO) in Kenya
- Developed a project with GEF support for introduction of Energy Standards and Labels in Kenya and the EA region



Demand Side Energy Efficiency Initiatives - 6

Time of Use electricity tariffs for Industry

- Kenya currently has no time-of-use electricity tariffs
- There were TOU tariffs between August 1, 1999 and May 29, 2000
- The tariffs were modified to single rates during power rationing caused by severe drought
- A pilot programme for TOU tariffs for industry is to be started within 2009

Demand Side Energy Efficiency Initiatives - 7

Installation of 1m CFLs on pilot basis:

- KPLC had tendered in late 2008 for consultancy/development services for CDM project involving installation of 1 million compact fluorescent lamps for domestic customers in Nairobi and Mombasa
- GoK decided to implement the project
- Tender process to be completed by GOK in time to facilitate registration of the CDM project in 2009
- Project to be rolled out depending on results of the pilot scheme

Conclusions

- Government has policies and strategies to promote energy efficiency and conservation
- Power system losses have reduced from a high of 21.5% to 16.6% over last 9 years
- KPLC is required to reduce the losses by 0.5% p.a. and is taking requisite measures
- Power tariffs are cost reflective – giving signals
- The GEF-KAM Industrial Energy Efficiency Project led to energy and cost savings of up to 30% for participating companies
- CEEC and EMA, with support from MOE and other entities, continue work of the project
- Pilot programs for TOU electricity tariffs for industry and for installation of 1million CFLs for domestic customers to be started in 2009

For any additional information or comment,
please do not hesitate to contact:

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**THANK YOU
FOR YOUR ATTENTION**

