KENYA PRESENTATION – ENERGY EFFICIENCY PROGRAMS

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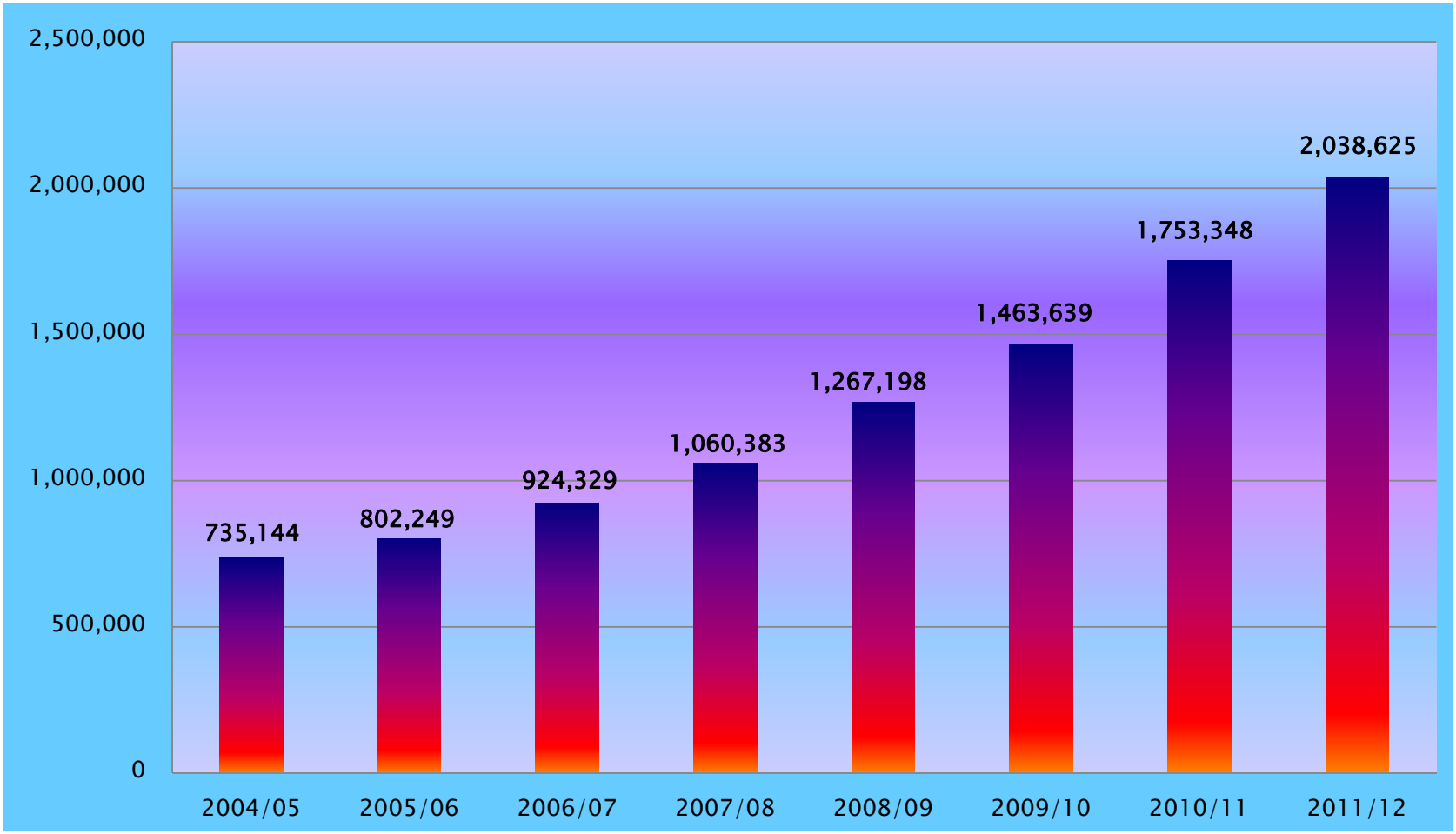
Outline

- Selected Power System data
- Country policy Framework
- Energy Efficient Programs
- Supply/demand side measures/Activities
- Residential Customers CFL Program
- Conclusion

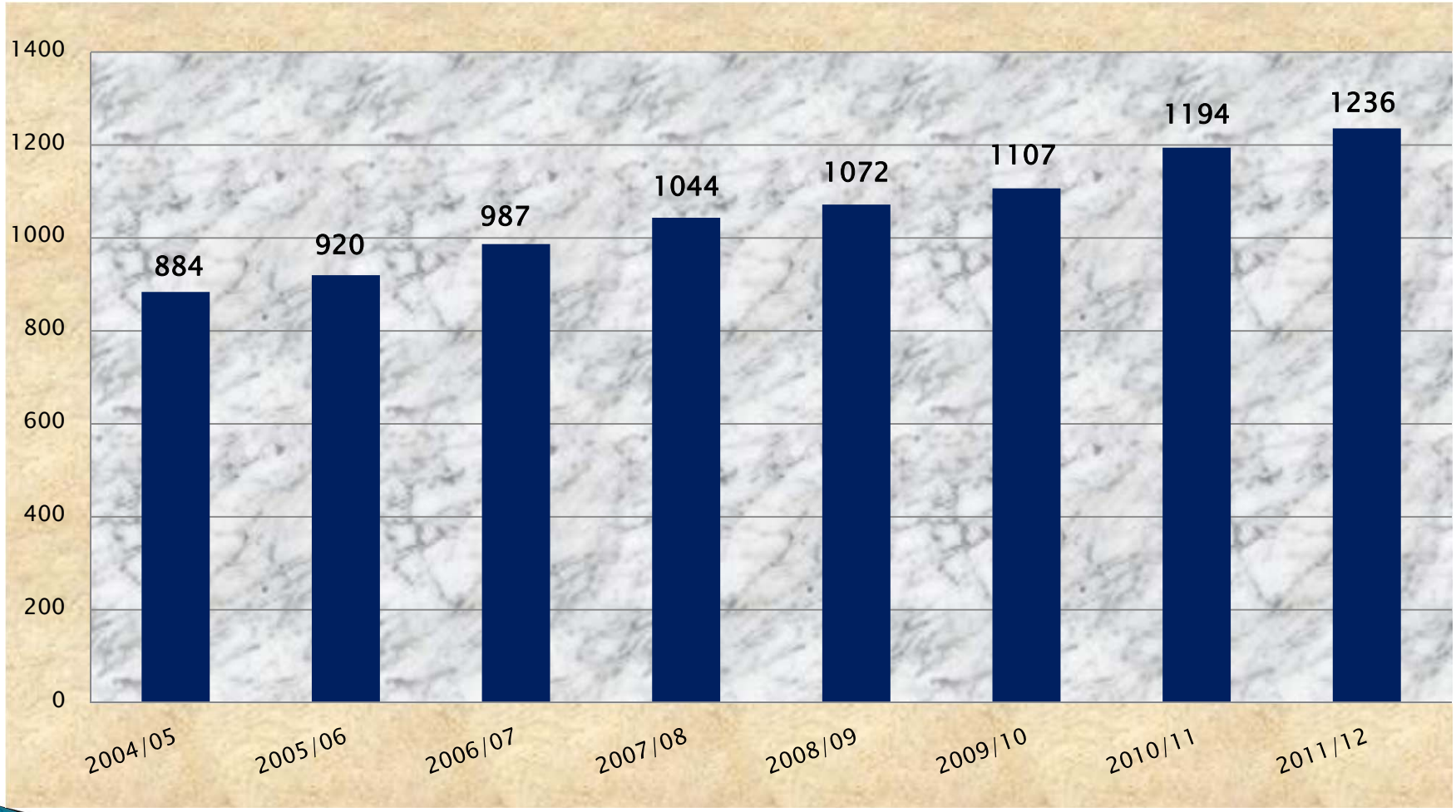
Installed Generation Capacity

- Total installed capacity is 1593 MW
  - Hydro 763 MW
  - Geothermal 198 MW
  - Thermal 601 MW
  - Co-generation 26 MW
  - Wind 5 MW
- Proportion of green energy out of the total installed capacity is 992 MW (62%)
- Hydro contributes about 48% but varies considerably depending on variation in hydrology
- Long term focus is on green energy (geothermal, wind & hydro imports)

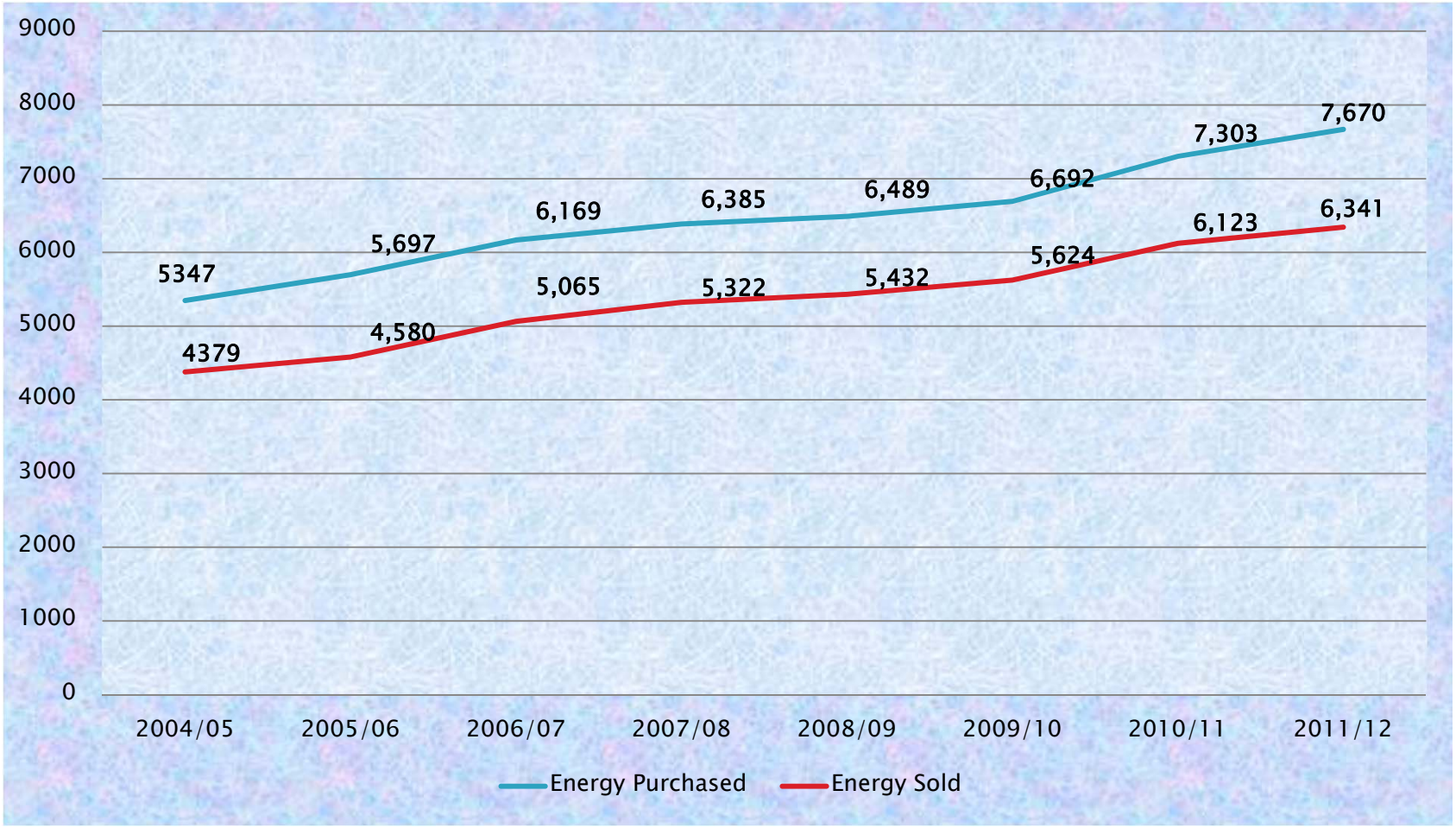
CUSTOMER NUMBERS TREND



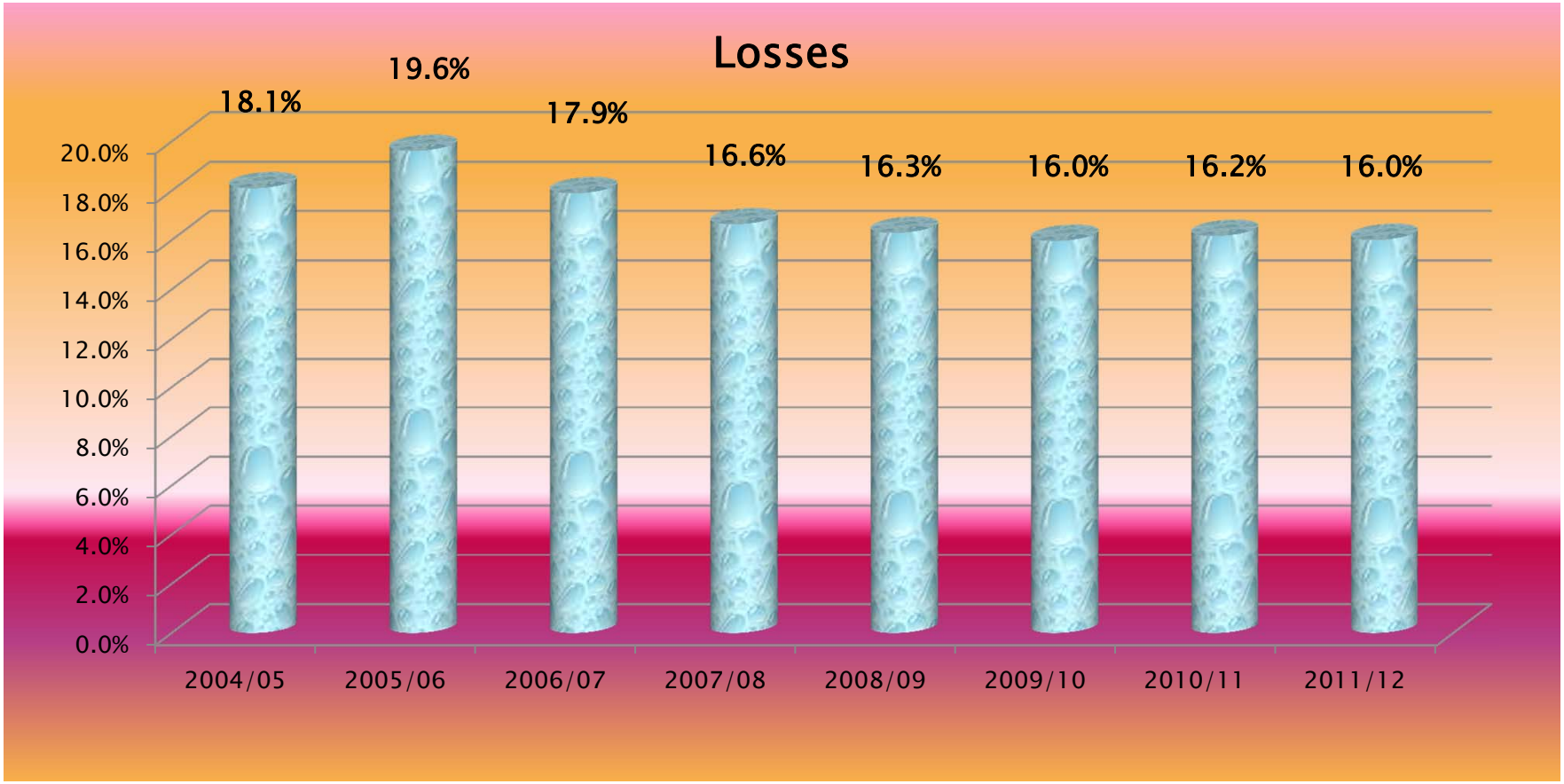
SYSTEM PEAK DEMAND (MW)



ENERGY PURCHASE Vs SOLD (GWh)

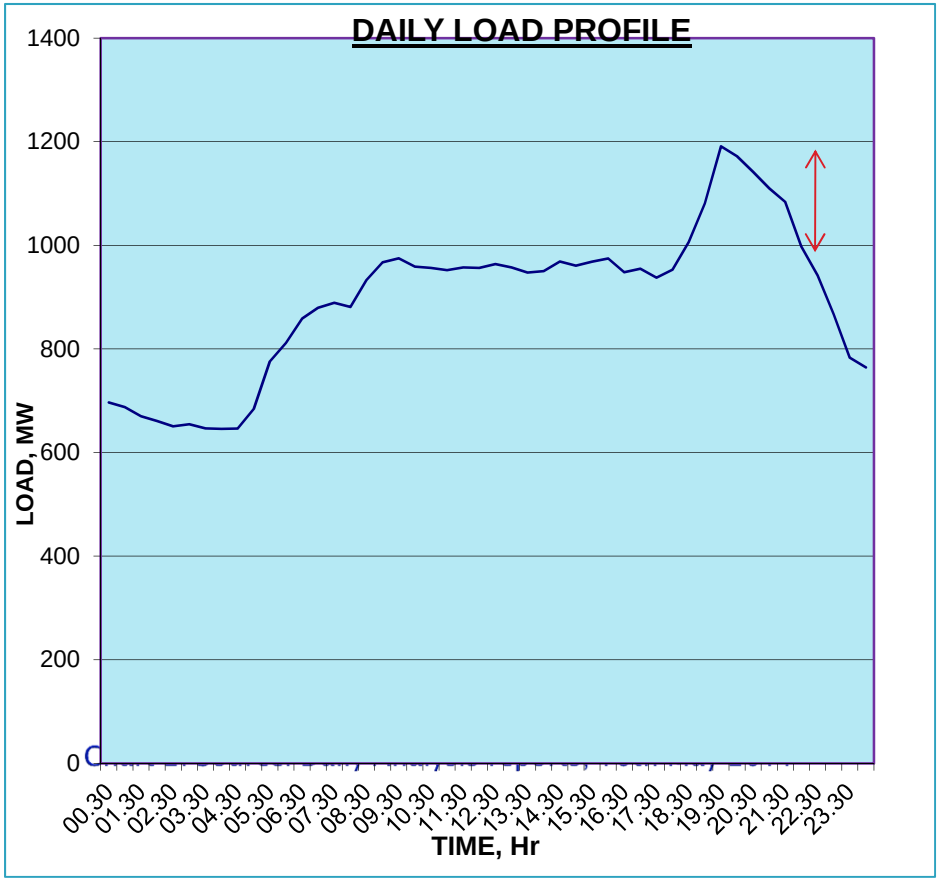


SYSTEM LOSSES TREND (%)



DAILY LOAD CURVES

- Evening lighting demand from households accounts for a major portion of the peak load.
- This consequently leads to a reduction in the system load factor which is a measure of the efficiency of utilisation of the available capacity.
- Efficient lighting technologies offer the cheapest and the fastest option of bridging the supply – demand gap by reducing the evening peak.



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Policy Framework

- The Policy framework on Energy in Kenya is anchored in Sessional Paper No.4 of 2004, currently under review
- Energy Act No. 2006 contains major policies articulated in the Energy Policy, currently under review
- The energy initiatives including Green Energy are contained in the LCPDP

Policy Framework cont'd

LCPDP

- Projected power demand to rise to 15,000 MW by 2030
- Projected generation capacity is 17,500 MW out of which 60% is expected to be developed from clean energy sources

Feed-in-Tariff (FiT) Policy

- Instrument to promote generation of electricity from RE sources
- It applies to Geothermal, wind, small hydro, solar and biomass

Policy Framework cont'd

Other Regulations

- Solar water heating regulations gazetted
- Blending E10 mandate for Western Kenya
- Energy Management regulations- underway
- Plan to legislate mandatory use of improved institutional woodstoves
- Solar PV regulations- underway

Wind Power

- A Wind Resource Atlas giving guidelines on wind regimes for the whole country is available

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Policy Framework cont'd

Solar PV

- Annual market for solar PV panels estimated at 500 kW and projected to grow at 15%
- One company has set up assembly plant for solar panels in Kenya with estimated production of 100 kW peak annually

Small Hydropower

- Feasibility studies done for specific sites
- Consultancy to undertake mapping of potential sites, to develop a national atlas about to commence.
- Support to communities to develop small hydropower

Policy Framework cont'd

Biogas technology

- Piloting of sewage based biogas plants in institutions of higher learning
- Piloting of electricity generation from flower farm waste through PPP
- Domestic biogas plants installation under the KENDBIP supported by the Netherlands Government- Target 8000 plants in 4.5 years by 2014

ENERGY EFFICIENCY PROGRAMS

The following identified projects are at various stages of implemention:

SUPPLY SIDE

- Energy Efficient transformers
- System reinforcement projects
- Grid Extension projects
- Renewable energy projects at the off grid power stations
- Capacitors installation on the power system

ENERGY EFFICIENCY PROGRAMS cont'd

DEMAND-SIDE

- CFL Roll out in the residential sector
- Energy Efficiency Improvement in buildings
- Replaced electromagnetic ballasts with electronic in three Government buildings
- Solar Water Heaters (SWH): Installation in the residential Sector
- Energy efficient street lighting program
- Support to KAM to undertake energy efficiency audits and other programmes
- Done 140 site audits, 21 Investment grade Audits, 25 specialized trainings
- To extend the agency agreement for a further 3 years
- Solar Lanterns – distribution of solar lanterns – 1500 lamps

Loss reduction efforts in Kenya Power – Supply side options

- System reinforcement to cater for growing load through
- ✓ Establishment of more primary substations to reduce the length of distribution lines
- ✓ Line reconductoring to upgrade thin conductor with thick conductor
- ✓ Specifications for low loss transformers & equipment
- ✓ Transformer relocation to load centres
- ✓ Capacitor installations on transmission & distribution lines and substations

DEMAND SIDE MEASURES

- DSM involves influencing the level & pattern of electricity usage by customers
- This in turn reduces the customer load (I) to reduce losses on the supply side
- Also creates capacity on the system to serve more customers
- Reduces use of fossil fuels, hence reduction in GHG emissions – environmental conservation
- Benefits the customer through reduced electricity bills

DEMAND SIDE ACTIVITIES

- Roll out of 1.25 Million energy saving bulbs – reduced peak demand by an estimated 50MW
- Energy Efficiency & conservation awareness campaigns across the country
- DSM carries out energy audits in customer premises to assist customers to save energy.
- Phase II roll out of energy saving lamps underway – a further 3.3million energy saving lamps
- Interruptible facility to switch off water heating load during peak period.
- Solar water heating initiative

KENYA POWER CFL ROLL OUT

- The Kenya Power, with financing form the Government of Kenya implemented an efficient lighting project in 2010.
- The project covered entire country – Grid connected customers and off-grid connected customers.
- Retrofitted 1.25million Compact Fluorescent Lamps CFLs in exchange with existing incandescent bulbs.
- Installed free of charge to residential & some small commercial customers
- Targeted middle and low level category of customers
- Objective – peak demand reduction & awareness creation on the benefits of energy efficient lighting.

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CFLS Vs INCANDESCENT LAMPS

- Most of the lighting in the residential sector in Kenya is provided by inefficient Incandescent Lamps (ILs)
- Compact Fluorescent Lamps (CFLs) are interchangeable with ordinary incandescent bulbs
- CFLs use only one – fifth of the electricity that is consumed by ILs for the same amount and quality of light.
- CFLs usually last 5-10 times longer than ILs. They are, however, relatively more expensive.

TECHNICAL SPECIFICATIONS

The Compact Fluorescent Lamps had to meet some minimum specifications:

- Safety and performance requirements as per IEC 60968/9;
- Compliance to the Electromagnetic compatibility and Radio Frequency interference as per IEC 6100-3-2 & CISPR 15 respectively
- Power Rating 11W
- Average lifetime of 15,000hours
- All Labeled KPLC/MOE NOT FOR SALE.
- Colour Temperature – 6500K – Daylight
- Must be compatible with the Kenyan network (240V & 50Hz)
- Ability to withstand voltage fluctuation range of 190 – 260V.
- Flicker free start
- Power factor >0.9
- Minimum light output = 620lumens
- Guarantee against manufacturer's defects – minimum 18months

RESIDENTIAL EFFICIENT LIGHTING (CFL) PROGRAM BENEFITS

- Proven technology with immediate peak clipping savings impact
- Improves the system load factor
- Cost savings to the customer
- Reduction in system losses
- Enhancement of energy security in the country
- Environmental benefits due to reduced energy consumption – reduction of GHG emissions.

RESIDENTIAL CFL PROGRAM BENEFITS Cont'd

- Massive distribution of energy saving bulbs is the best solution to improve energy efficiency.
- The experiences in many countries, from Mexico to South Africa show that it is the fastest, smartest and cheapest solution to reduce energy consumption, especially during peak periods.

PROJECT STEPS

The CFL program consisted of:

- CFL Procurement
- Project Management and Logistics
- Implementation – retrofit by KP staff
- Communication – Awareness campaigns
- Project monitoring
- Project close & audit by the GoK
- Disposal of ILs

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CFL COMMUNICATION & AWARENESS CAMPAIGNS

- Awareness campaigns carried out thro various channels prior and during project implementation; TV, print, road shows, billboards, etc
- Program Branded " **Badilisha Bulb**"
- Sensitize our customers allow our teams in to their houses for the retrofitting exercise
- Also create awareness on the benefits of energy saving bulbs for those who did not benefit.

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PROJECT CHALLENGES

- Delays in CFL deliveries
  - Interfered with project implementation schedule

- Delays in container deliveries
  - Suppliers delayed in delivering containers;
  - Sometimes damaged containers were delivered & rejected thus delaying the project
- Mobilization of adequate resources– staff & transport
  - Suspended some activities e.g. meter reading to concentrate on the exercise
  - Over 500 field staff were involved in the project
  - Regional project champions in charge of project implementation in the regions
- Unavailability of customers at home despite communication roll out.
- Safety concerns in some estates – police involved in the program
- Negative publicity
  - Intensive campaigns through the press

KEY MESSAGES

- CFLs provide energy efficiency (cost savings) and carbon revenue as benefits
- Kenya has a great potential to install these energy efficient lights in all sectors: residential, commercial, etc.
- Developing countries are taking advantage of this lighting technology, e.g. Ghana, Senegal, Mexico, etc

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Policy Incentives

- Duty waiver on RE plant and equipment
- Government offers letters of comfort to IPPs
- Resource assessment and feasibility studies availed to investors through a bidding process
- No licensing required for small power plants less than 1 MW

CONCLUSION

- Comprehensive policy framework Critical
- Success in Energy efficiency effort requires supply side and demand side approaches
- 1.25 million CFLs contributed to demand saving of at least 50MW
- Mass roll out of efficient lighting cost effective
- Energy audit enhances value for electricity use
- Participation in standard & labeling policy program promotes efficient electrical equipment usage

END.

THANK YOU!!

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