



# **Energy Efficiency as a driver for Economic Transformation and Sustainable Development \***

**By**

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# Outline

- Introduction
- Common Energy Wastage Practices in Nigeria
- Energy Efficiency and Economic Development
- Energy Efficiency Initiatives in Nigeria
- Conclusion

# INTRODUCTION

- **Energy services have a significant role in facilitating both social and economic development.**
- **Energy underpins economic activity; enhances productivity; and enables fulfilment of the basic human needs of nutrition, warmth, and lighting, in addition to education and health. Therefore, energy wastages through inefficient practices slow down development.**
- **Energy efficiency is the improvement in practices and products that allows more to be done with less energy (Pabla 2006). It reduces the energy necessary to provide energy services without compromising the quality and quantity of services thereby leading to the conservation of available energy resources.**
- **Efficient usage of the available energy resources prevents wastages, allows energy resources to be conserved, promotes economic development and limits environmental damage. Efficient Energy system is now one of the key drivers of development worldwide, with many nations' now making policies to encourage efficient, rational and cleaner energy use.**

# Introduction.. Contd....

- **The Energy Commission of Nigeria (ECN) established by the Energy Commission Act No. 62 of 1979 and amended by Act No. 32 of 1988 and Act No. 19 of 1989 is mandated to strategically plan and coordinate national policies in the field of energy in all its ramifications.**
- **By this mandate, the Commission, amongst other functions, encourages sustainable energy production and consumption pattern in all sectors of the nation's economy.**
- **Sustainable development is defined as “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*”. *Energy Efficiency and conservation is the cheapest and sure path to that development.***
- **It is the mandatory responsibility of the ECN to advice governments at all levels – FG, States and LGAs on the need to diversify to other energy sources as appropriates. Energy Efficiency is seen as an energy source that would have been wasted.**
- **Promoting energy efficiency and conservation measures reduces the rate of energy consumption and operational cost without reducing the quality and quantity of services.**

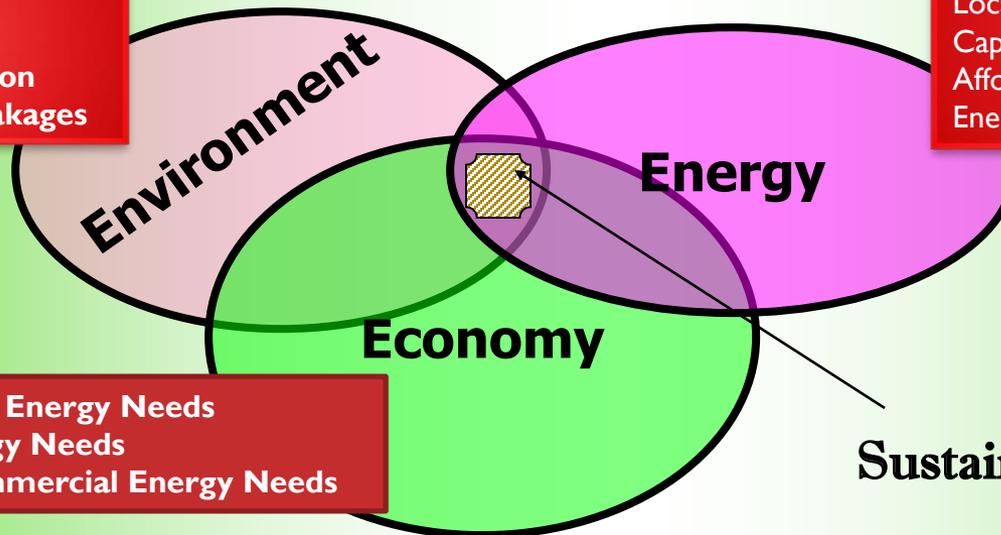
# Introduction..Cont'd

There is natural link between “Energy, Development and Environment”. Sustainable development is at the center of energy, environment and the economy:

- ❖ Global Warming
- ❖ Air Pollution
- ❖ Acid Rain
- ❖ Water Pollution
- ❖ Spills and Leakages

- Energy Resource Priorities
- Distributed Energy Resources
- Energy Reduction thru Efficiency
- Incorporate Renewable Energy Sources
- Localize Energy Production
- Capture and Reuse Wasted Energy
- Affordability and Life-cycle costs
- Energy Security

- Transportation Energy Needs
- Buildings Energy Needs
- Industrial /Commercial Energy Needs



**Sustainable development**

Energy for sustainable city development therefore, implies exploiting energy resources for economic benefits, while simultaneously protecting the environment and conserving the State's natural resources.

# Introduction Cont'd....

Table 1. Nigeria's Energy Supply and The Economy

S/N	ITEMS	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1.	Electricity generation (billion kWh)	22.03	23.9	24.22 (503)* (10,695)* *	23.8	23.3	21.27 (562)* (18,603)**	20.8	25.02	27.7 (619)* (20,407)* *	29.6
2.	Energy Consumption per Capita (kgoe/Capita)	151.3	125.5	132.6 (680)* (1,780)**	87.1	81.4	80.8 (670)* (1,830)**	83.1	77.8	73.6 (670)* (1880)**	65.7
3.	Electricity Consumption/capita (kWh/Capita)	174.6	176.4	181.4 (563)* (2596)**	167.6	161.2	142.9 (571)* (2782)**	135.2	157.1	165 (592)* (2933)**	175.9
4.	GDP/Capita (US\$/Capita)	620.7	658.0	826.3 (2314)* (8,492)**	1030.3	1223.5	1286.3 (2540)* (9550)**	1,106.8	1440.7	1470.6 (1281)* (7520)**	1513.4
5.	Energy Intensity (kgoe/ US\$)	0.244	0,191	0.161 (0.294)* (0.210)**	0.085	0.067	0.063 (0.264)* (0.192)**	0.075	0.054	0.050 (0.550)* (0.250)**	0.043
6.	GDP Growth Rate (%)	9.6	6.6	6.5	6.0	6.5	6.0	7.0	8.0	7.4	6.6

**Sources: CBN (2005-2012), NCC, Osogbo (2009 -2012),  
\*Africa Average - IEA (2007, 2010, 2013)  
\*\*World Average - IEA (2007,2010, 2013)**

# Introduction Cont'd....

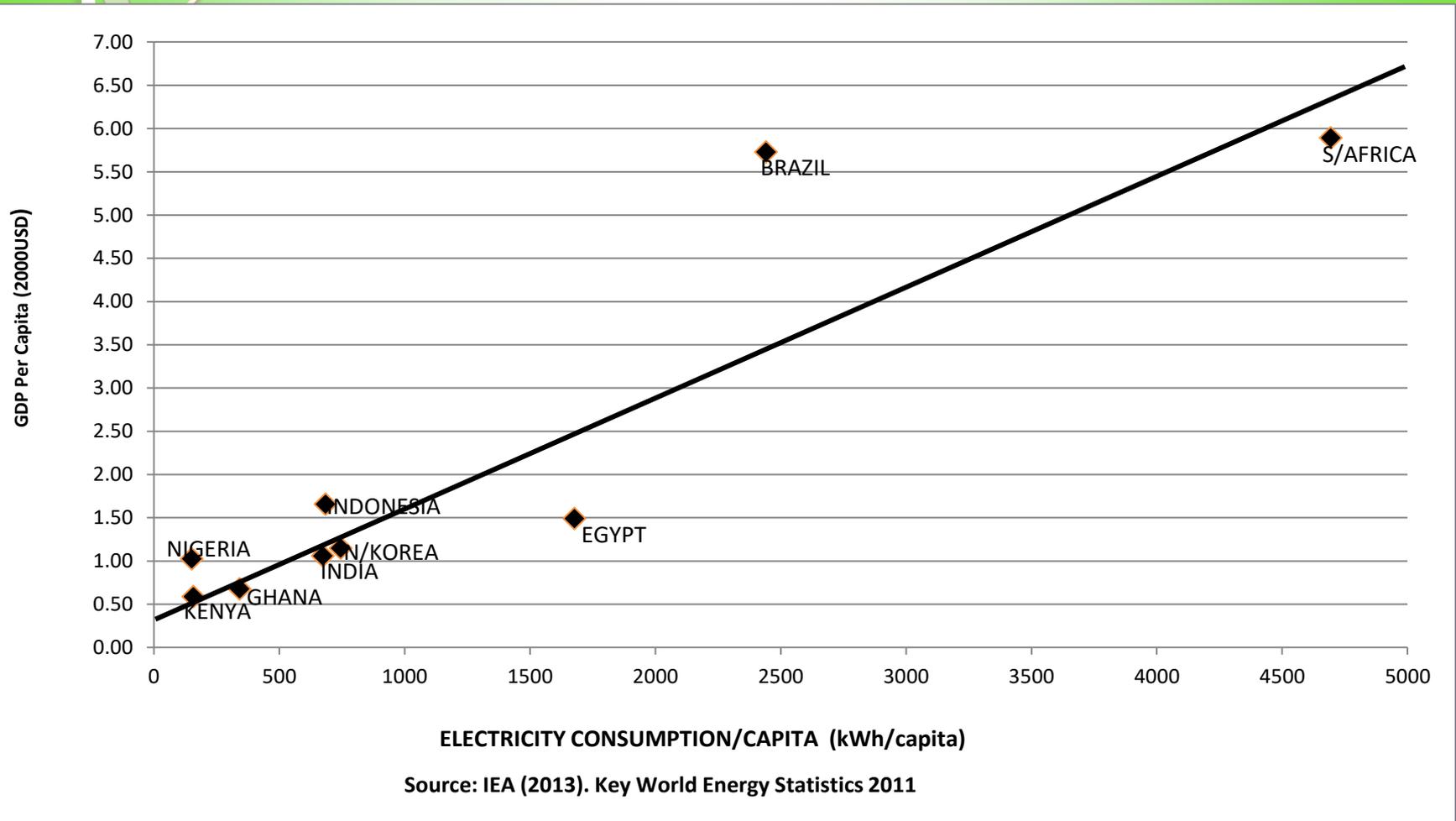


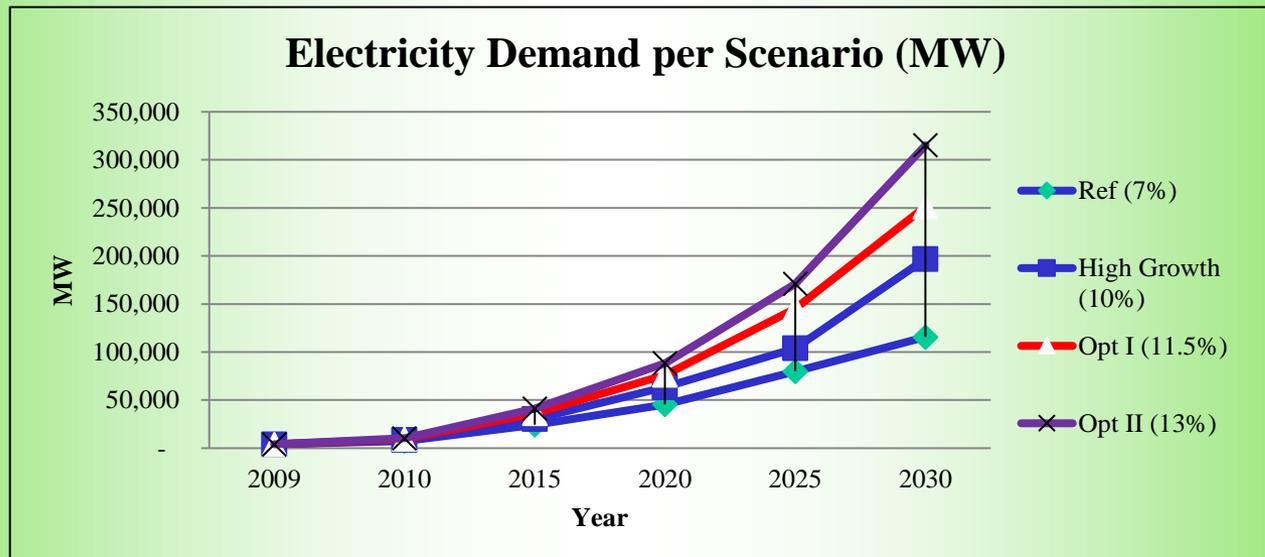
Figure 1 Effect of Electrical Energy Consumption on Economic Development of Nations.

# Nigeria's Energy Demand and Supply Projections/ Targets

Electricity Demand Projections for Nigeria under various Economic Scenarios

	2009	2010	2015	2020	2025	2030
Ref (7%)	4,052	7440	24380 (14,000)*	45490 (40,000)**	79798	115674
High Growth (10%)	4,052	8420	30236	63363	103859	196875
Opt I (11.5%)	4,052	9400	36124	76124	145113	251224
Opt II (13%)	4,052	10230	41133	88282	170901	315113

\* Power Roadmap Target (PRMT) by 2014 \*\* PRMT by 2020

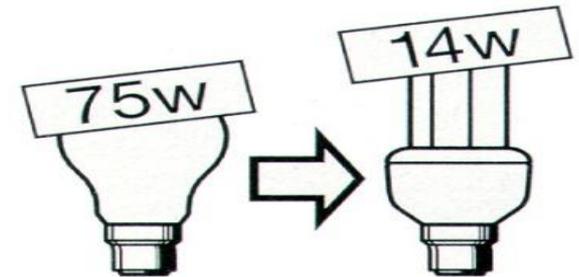
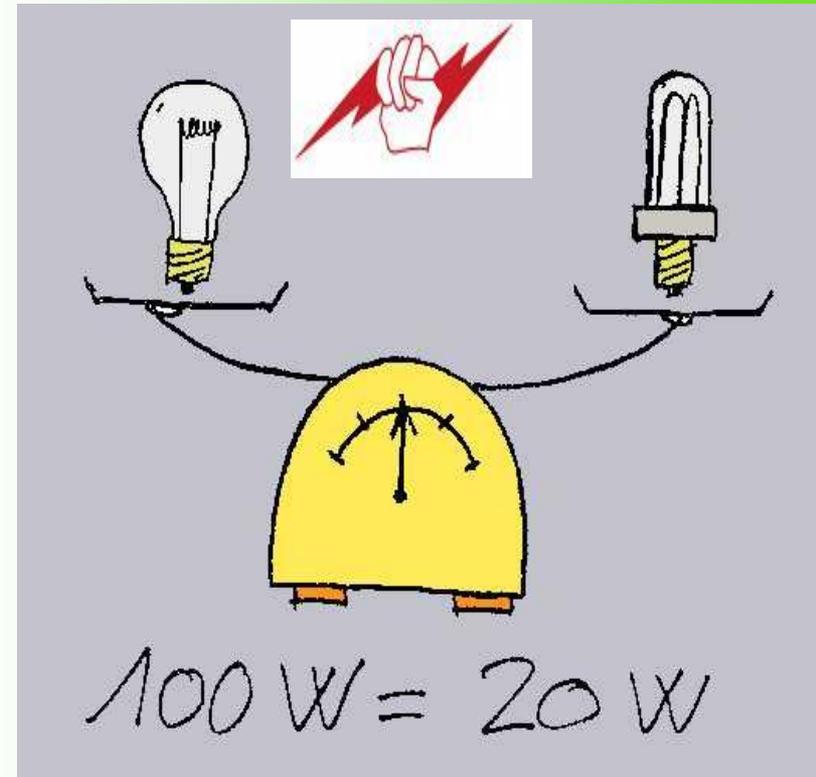


Source: ECN, 2012

# Introduction: Energy Efficiency

## Defined

- **Energy Efficiency is as old as energy use itself. Fires were open to sun and latter improved to enclosed spaces and then later replaced by ovens, etc.**
- **Energy Efficiency is using “less energy for a given service”.**
- **It is a process that is aimed at:**
  - **Minimizing amount of energy use/costs/ waste without affecting production & quality**
  - **Minimizing environmental effects.**
- **Efficiency =  $\frac{\text{Output}}{\text{Input}}$**



# Common Energy Wastage Practices in Nigeria: Residential

- **Leaving Appliance on when not in Use;**
- **Dominant Use of Incandescent Light Bulbs;**
- **Switching Outdoor Lighting on during the Day;**
- **Security/Street Lights On during the Day;**
- **Forgetting Foods/Water on Fire to Drying;**
- **Windows Open When AC is in Use;**
- **Opening and Closing Fridges & Freezers Unnecessarily;**
- **Boiling full bucket of Water to 100<sup>0</sup>C, pour out and Cooling again with cold water to Bathing Temperature;**
- **Purchase of Secondhand Appliances;**
- **Putting on Light to Advertise Goods and for Decorations;**
- **ETC...**

# Common Energy Wastage Practices in Nigeria: Industrial Sector

- Fuel, gas, or oil and Steam Leaks;
- Compressed air leaks; Condensate leaks;
- Water leaks; Damaged or missing insulation;
- Excessive heating or cooling; Leaks of (or excess in) heating, ventilation, and air conditioning system;
- Burners out of adjustment;
- Faulty steam trap operation (each trap ought to be tagged with date of inspection);
- Dirty heating surfaces such as coolers, exchangers, and so forth;
- Dirty motors;
- Worn belts;
- Improper viscosity of lubricating oils for large electric drives and hydraulic pumps; (proper viscosity minimizes pump drive slippage);
- Dirty lamps; Excess or accumulated additives in fuel;
- Improper operating pressure and temperature and Waste heat

# EE and Sustainable Economic Devt

**Energy Efficiency drives economic growth because:**

- **Energy saved equals energy generated;**
- ⑩ **Most energy resources are depletable: increased efficiency and conservation will extend their life span and availability;**
- ⑩ **With economic growth there is likely to be energy stress/crises: increased efficiency and conservation will delay and lessen the impacts of such crises/shortages;**
- ⑩ **There is widespread public concern about the environmental consequences of energy production and use: increased energy efficiency and conservation in general reduces those consequences;**
- ⑩ **Investments in energy efficiency and conservation often provide a better return than investments in energy supply: energy efficiency and conservation will improve the general efficiency of the economies;**

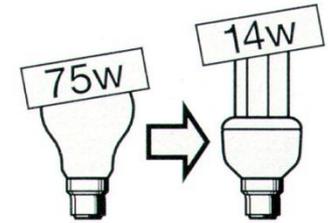
# EE and Sustainable Economic Devt: **Energy Saved with Efficient Lighting**

ADEME  
1200

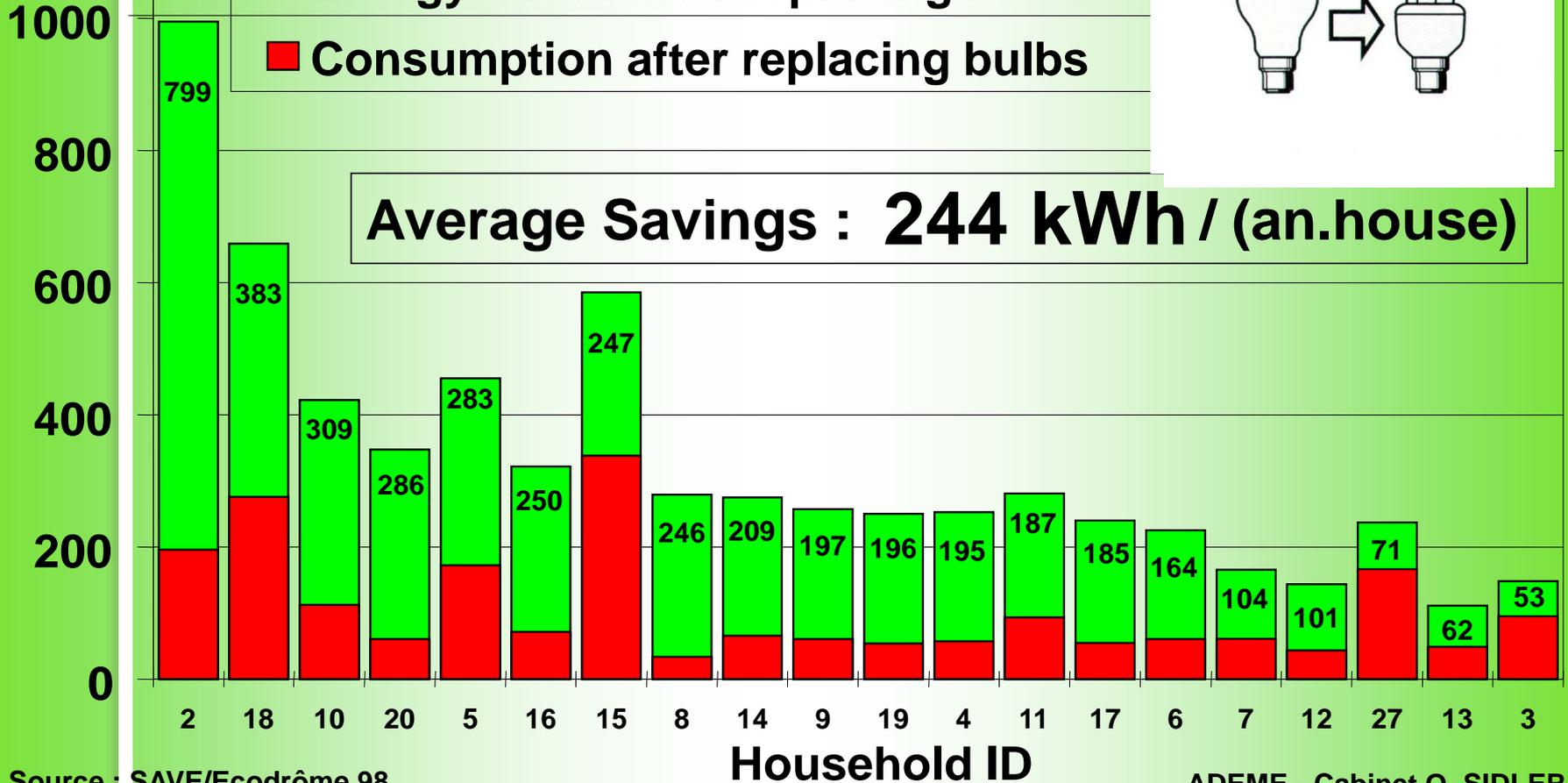
CEE

kWh/an

- Energy saved after replacing bulbs
- Consumption after replacing bulbs



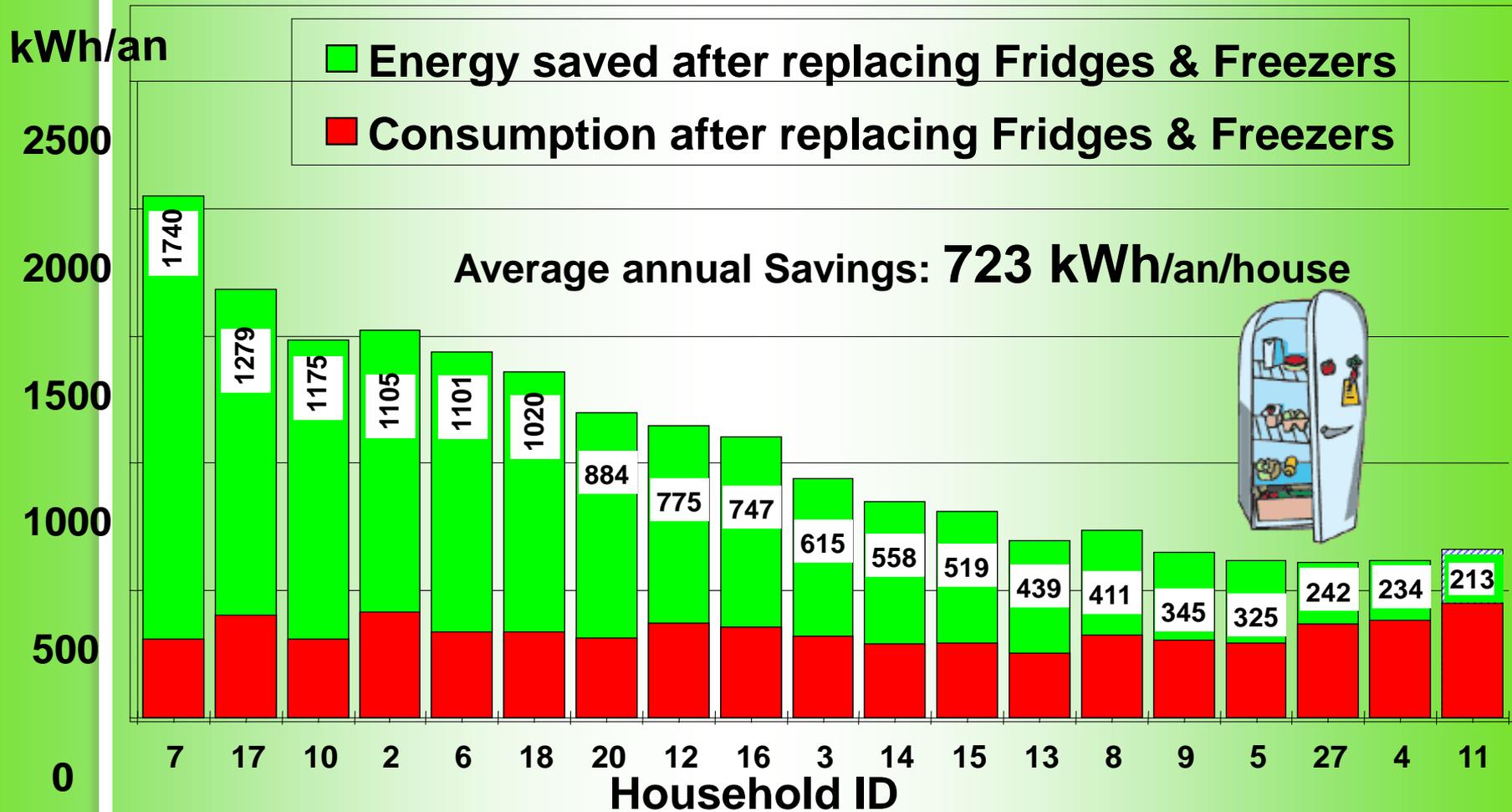
**Average Savings : 244 kWh / (an.house)**



Source : SAVE/Ecodrôme 98

ADEME - Cabinet O. SIDLER

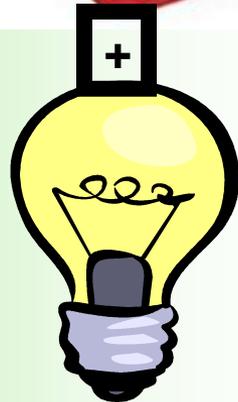
# EE and Sustainable Economic Devt: Energy Saved with Efficient Refrigerators



Source : SAVE/Ecodrôme 98

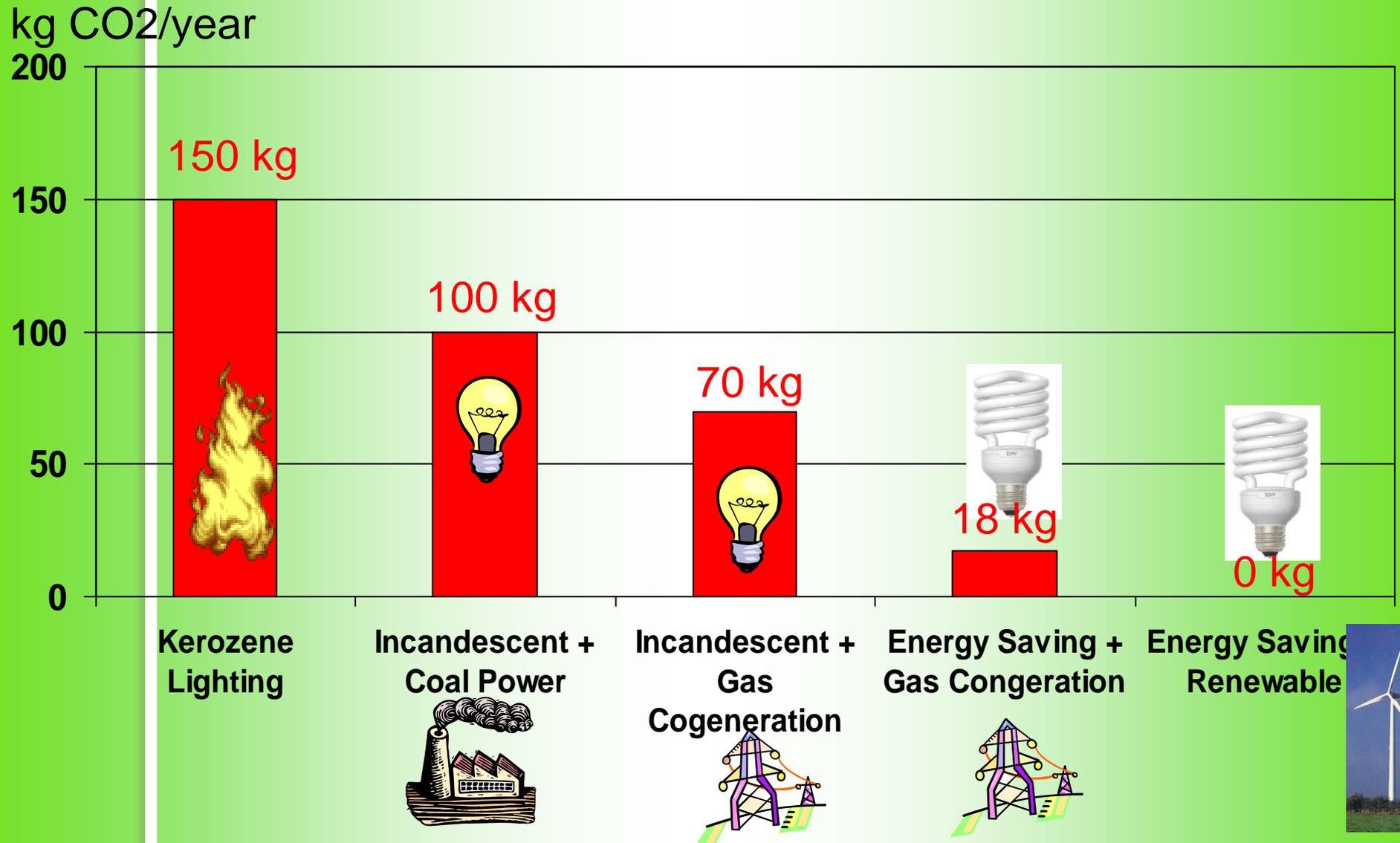
ADEME - Cabinet O. SIDLER

# EE and Sustainable Economic Devt: Delay Urgent Needs For Higher Generating Capacity



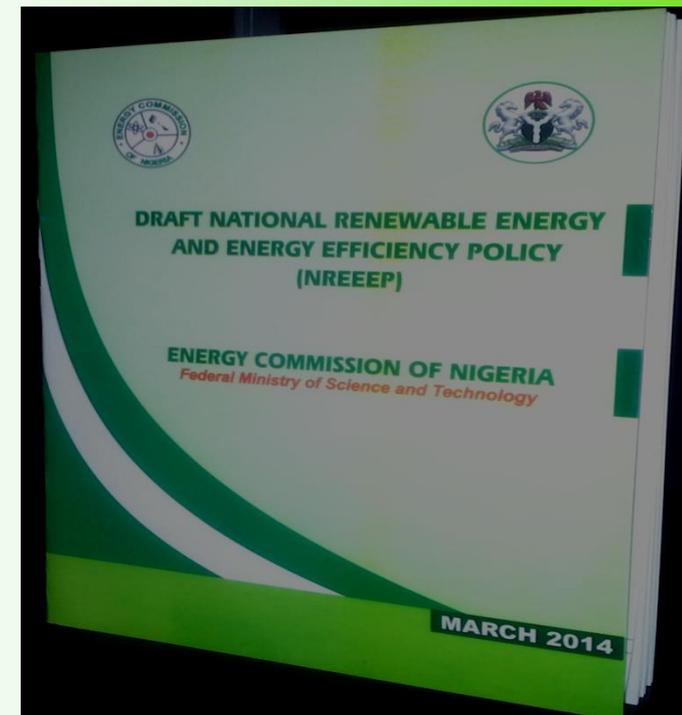
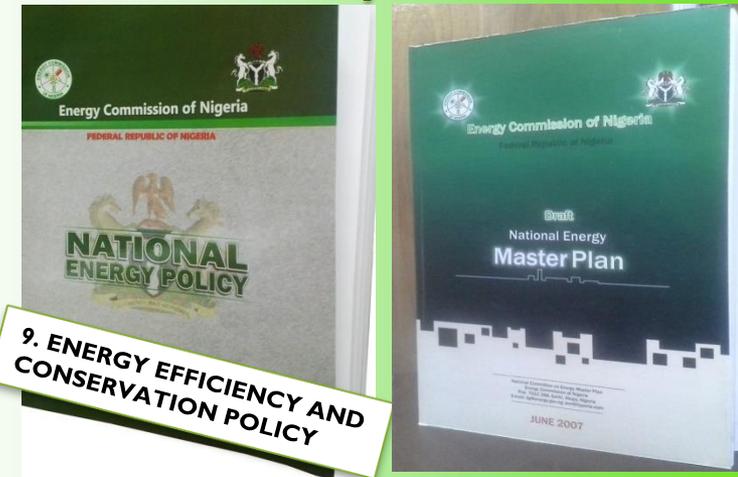
- × Minimizes the need for new or bigger power stations, thus, free up capital for other investments like health, education, shelter, etc.

# EE and Sustainable Economic Devt: **Environmental Benefits**



# Energy Efficiency Initiatives in Nigeria: EE Policy in Place

- The draft revised National Energy Policy and the National Energy Master Plan contain Energy Efficiency and Conservation Policies and action plans covering the key sectors of the nation's economy, namely: Residential, Industrial, Transportation, Services/Commercial, Agriculture and Building Designs.
- Also, the National Energy Efficiency policy has been drafted. The Energy Efficiency and conservation Policy contains:
  - Cross-Cutting Policies
  - Energy Efficiency Policy in Residential Sector;
  - Energy Efficiency Policy in Industrial Sector;
  - Energy Efficiency Policy in Commercial Sector,
  - Energy Efficiency Policy in Transport Sector
  - Energy Efficiency Policy in Agriculture Sector
  - Energy Efficiency Policy in Building Designs
- Each section of the EE contains policy statements, policy objectives and strategies grouped at the end into the short, medium and long-term implementation strategies.



# Energy Efficiency Initiatives in Nigeria: Replacing IL with CFLs ( One Million CFL Demo Project)

❑ Replacement of Incandescent Lamps with 1 Million High Quality Compact Fluorescent Lamps (CFL) across the Nation. A ECN/CUBA/ECOWAS Pilot Project – 2008-2010

Beneficiaries of the project were:

- ❖ 22 nos. Estates in Abuja
- ❖ 10 nos. States
- ❖ 14 nos. Tertiary Institutions
- ❖ 6 nos. ECN Research Centers
- ❖ 7 nos. Hotels in Abuja
- ❖ Jaji Military Cantonment, Kaduna
- ❖ Civil Defence Headquarters/Staff Quarters



# Energy Efficiency Initiatives in Nigeria: Quality Assurance



- Light Testing Analysis Machine were installed in the laboratories of the Standard Organization of Nigeria (SON) and the Energy Commission's National Centre for Energy Efficiency and Conservation (NCEEC), Lagos.
- The testing facilities will enhance the ability of SON and ECN to fight against poor quality of CFLs in the country.

# Energy Efficiency Initiatives in Nigeria :THE PREPAYMENT SYSTEM



**The prepayment electricity project : ensures accurate billing.**

**Allows the customer to monitor their household consumption at their own convenience.**

**Provides high degree of privacy since there are no intrusions by meter readers arriving at irregular intervals.**

# Energy Efficiency Initiatives in Nigeria : **CLEAN COOKING STOVES**



SERC Improved Woodstoves



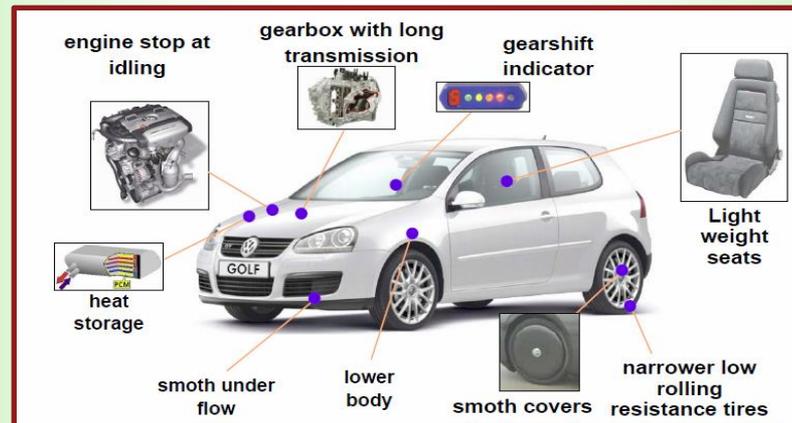
## Improved Wood/Sawdust Stoves



- Three-stone stable using fuelwood with efficiencies of about 5%-7%. (Traditional technology of cooking and heating)

# Energy Efficiency Initiatives in Nigeria :Transport Sector

- Sustainable modal shift in transportation like:
  - motorized modes to cycling and walking;
  - private vehicles usage to public mass transport.
- Ensuring better integration between different public transport systems, walking and cycling.



# **Energy Efficiency Initiatives in Nigeria : Low/No Cost EE Best Practices**

- **Switch-off and remove plug from wall-socket when not in use**
- **Off Outdoor/Security Lighting when day break**
- **Use daylight as much as possible**
- **Don't over boil water for bath**

# Energy Efficiency Initiatives in Nigeria

- Drafted Renewable Energy and Energy Efficiency Policy document
- Replacement of Incandescent Lamps with 1 Million High Quality Compact Fluorescent Lamps (CFL) across the Nation. A ECN/CUBA/ECOWAS Pilot Project – 2008-2010
- Establishment of the National Centre for Energy Efficiency and Conservation University of Lagos.
- National awareness creation/capacity building across the Nation
- Energy efficiency awareness campaign through posters, leaflets, handbills, radio, TV displays
- Walk-through energy audit across the Nation

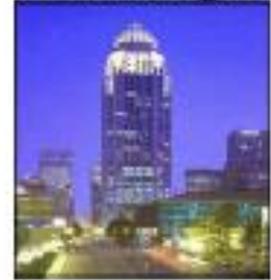
# Energy Efficiency Best Practices

- Awareness Campaigns
- Behavioural Change
- Research, Devt. and Demo.
- Education and Training Program
- Procurement of Energy Audit Tool Kits
- Energy Audit Program
- Implement Energy Saving Measures
- Energy Codes and Standards – Energy Labeling
- Energy Efficiency Database
- Promotion of Energy Services Companies (ESCOs)
- Networking for Improved Energy Efficiency
- Energy Efficiency Awards

products



buildings



homes



# Conclusions

- **Nigeria is blessed with abundant conventional and renewable energy resources that if properly harnessed can adequately cater for the needs of the nation.**
- **For us to meet our electricity/energy demand, Energy efficiency and conservation strategies should be entrenched into the nation's development plans;**
- **REMEMBER: Energy Saved = Energy Generated; so, Energy Efficiency is a renewable energy source that would have been otherwise wasted.**



*Thank You*

**AND GOD BLESS!**

