



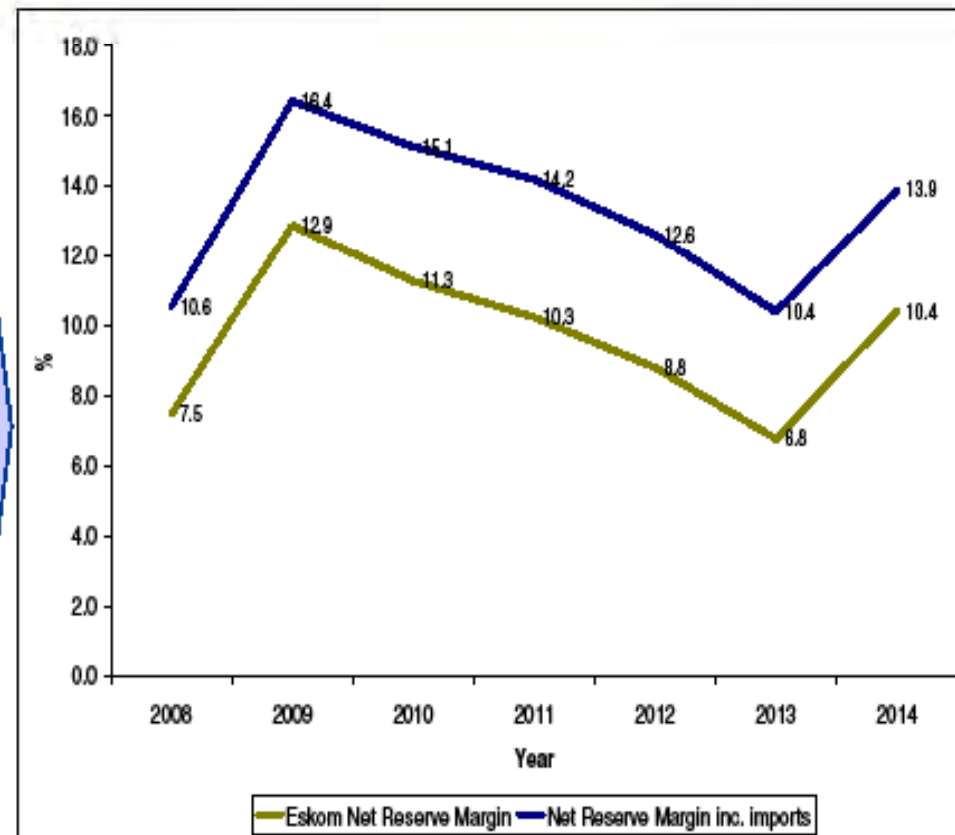
# Energy Efficiency Energy Services



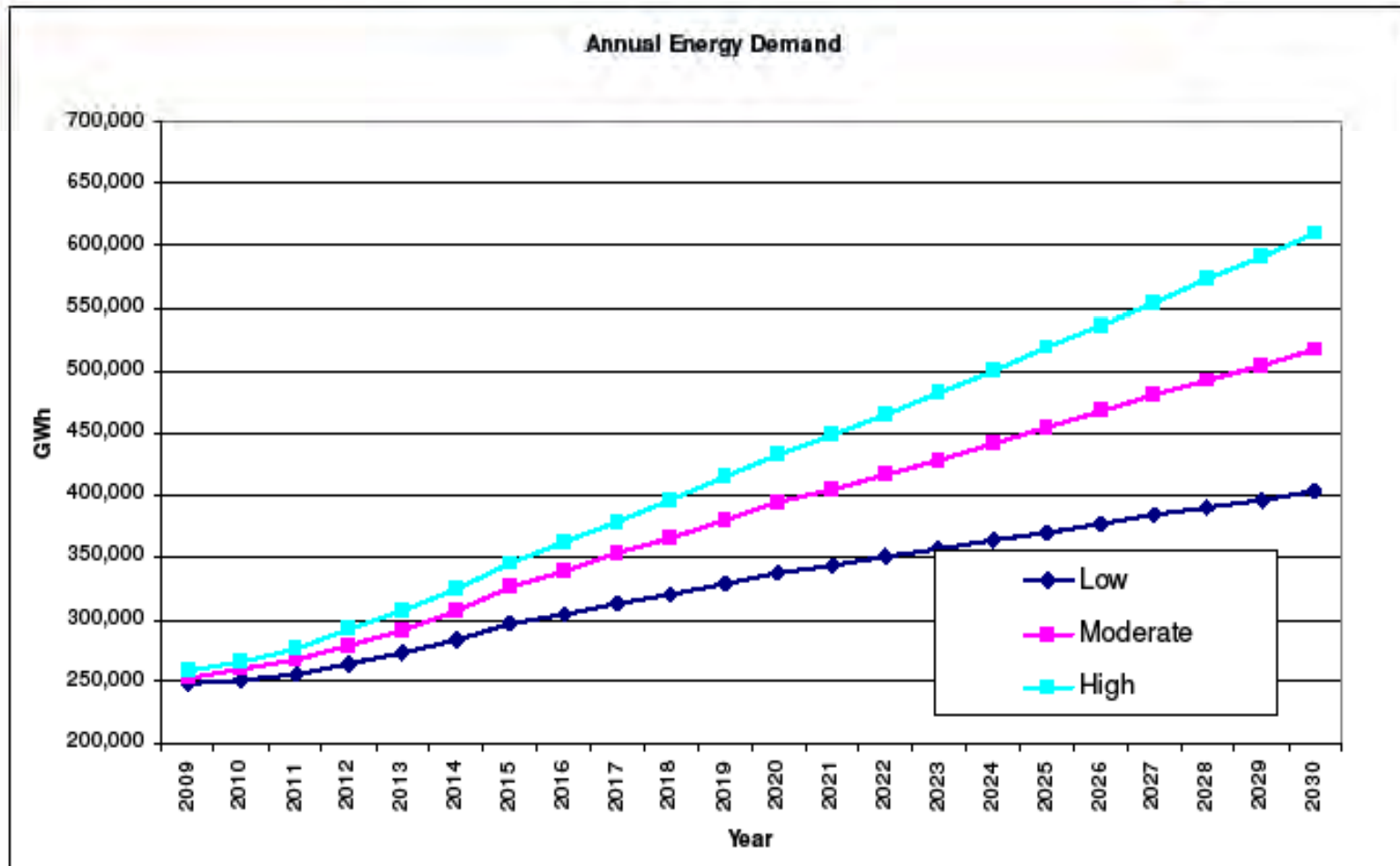
# Prognosis for the Reserve Margin

## Key assumptions

- **Growth:** As per MYPD2 forecast
- **Supply side assumptions:**
  - Eskom's new build programme as per original schedule.
  - Does not include the full IPPs potential (DoE IPP OCGT, the renewables and co-generation options)
- **Demand side assumptions:**
  - Does not include full impact of demand side management programmes or other demand management programmes.



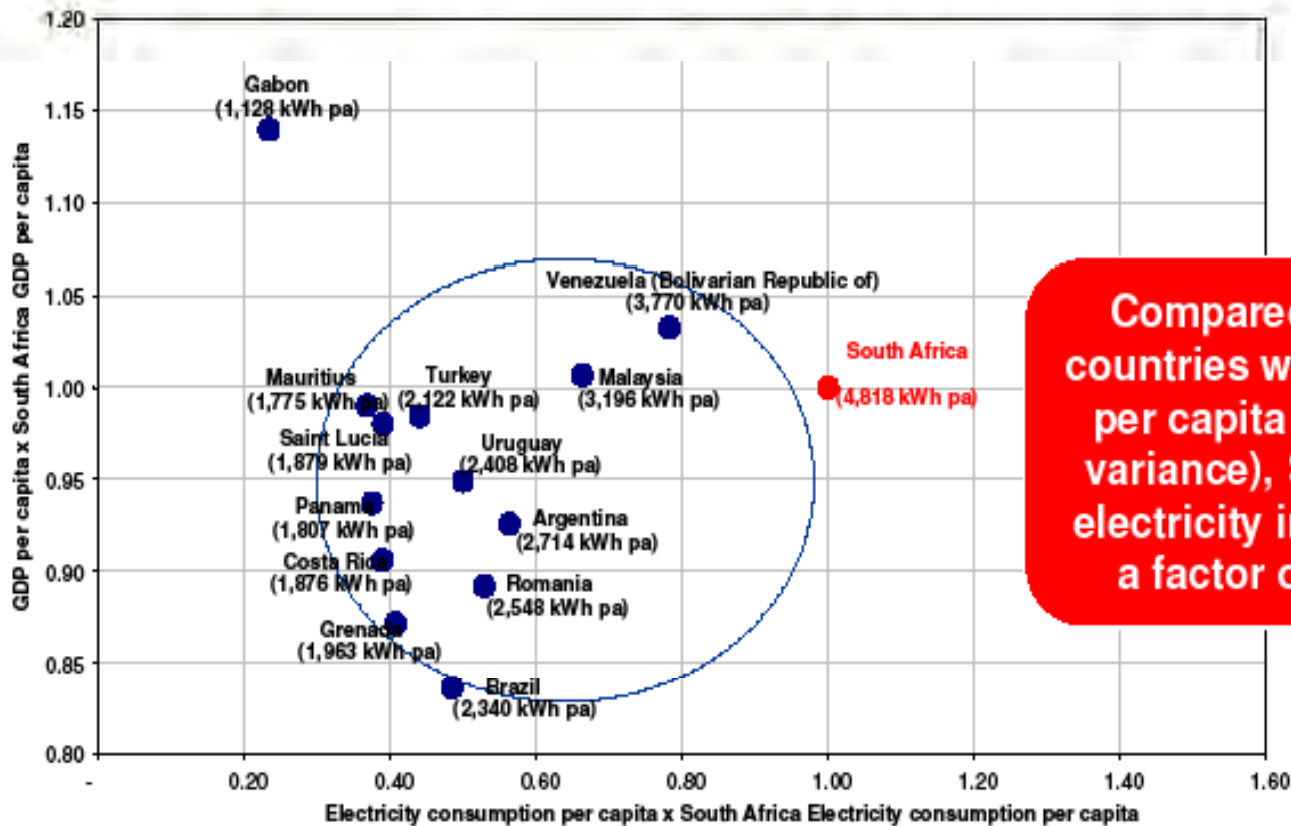
# Long term electricity demand outlook – Annual energy demand



# The Case for Energy Efficiency

## South Africa vs. the Rest of the World

Per Capita Electricity Consumption for Countries with similar GDP per capita ( $\pm 20\%$ ) relative to South Africa\*



**Compared to other countries with a similar per capita GDP (15% variance), SA is more electricity intensive by a factor of 35-65%**

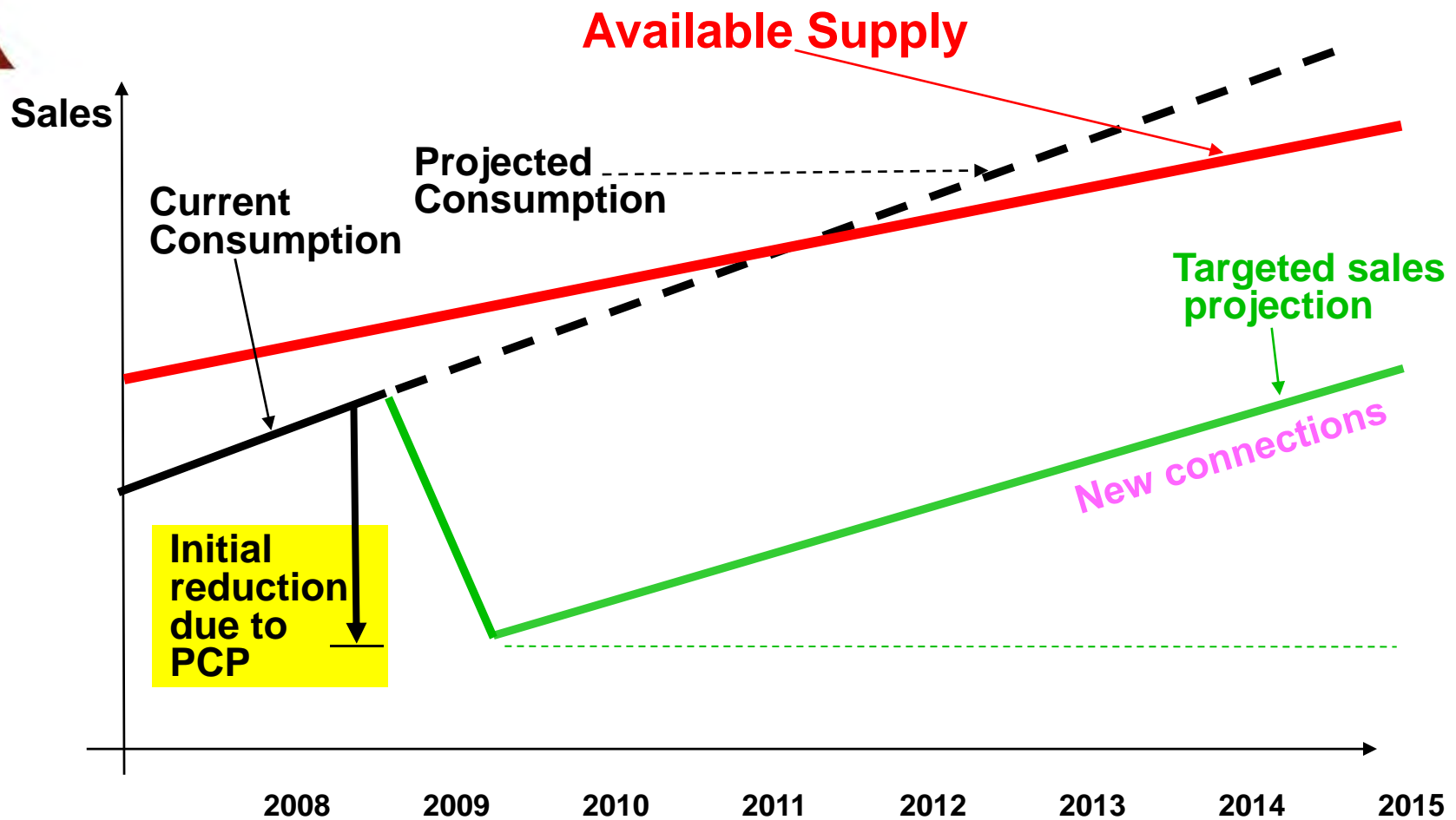
Source: UN (United Nations). 2007 d. The 2004 Energy Statistics Yearbook. Department of Economic and Social Affairs, Statistics Division. New York.



\*Situation as in 2004, beneficiation policy and co-generation will alter the above picture

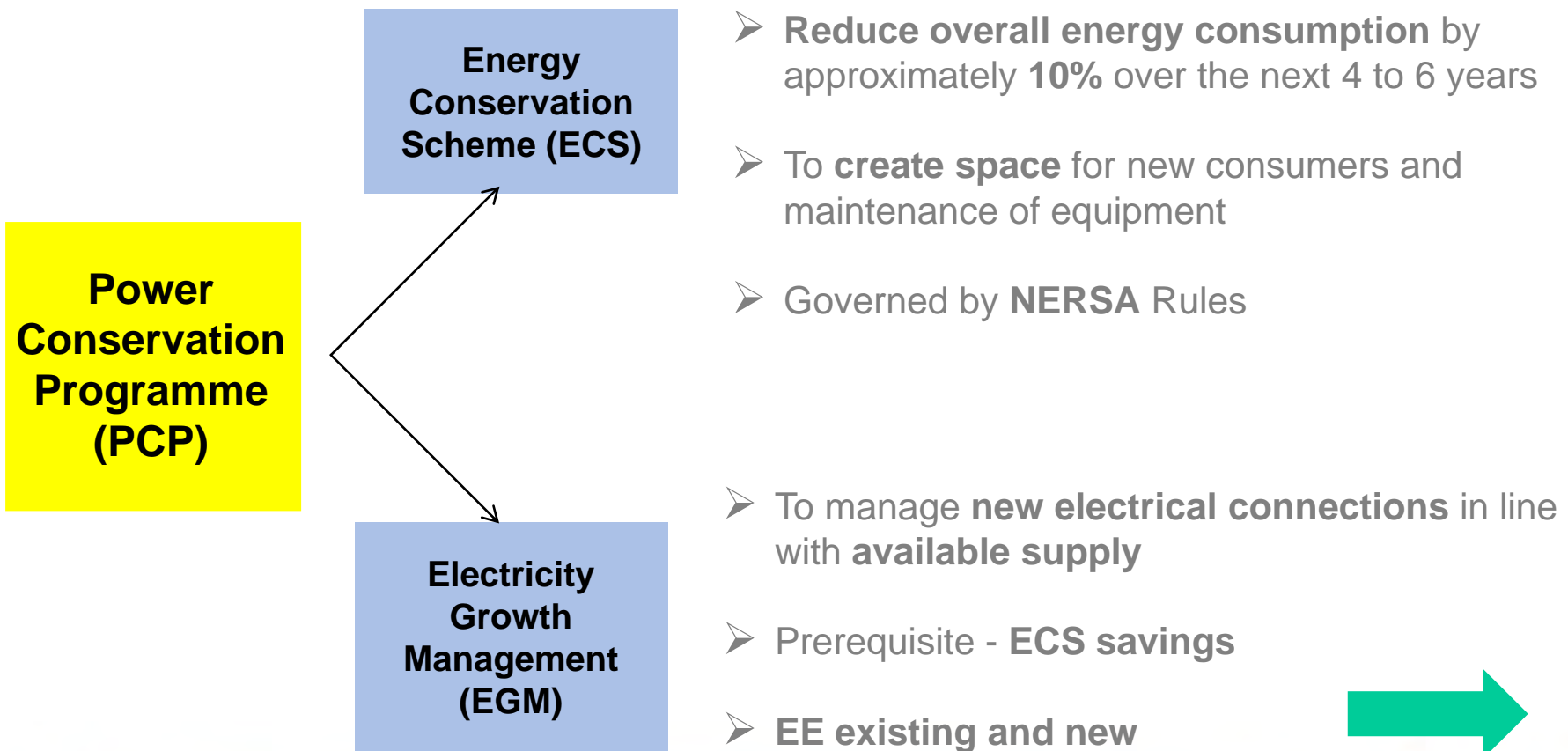


# Projected Supply and Demand picture if including PCP

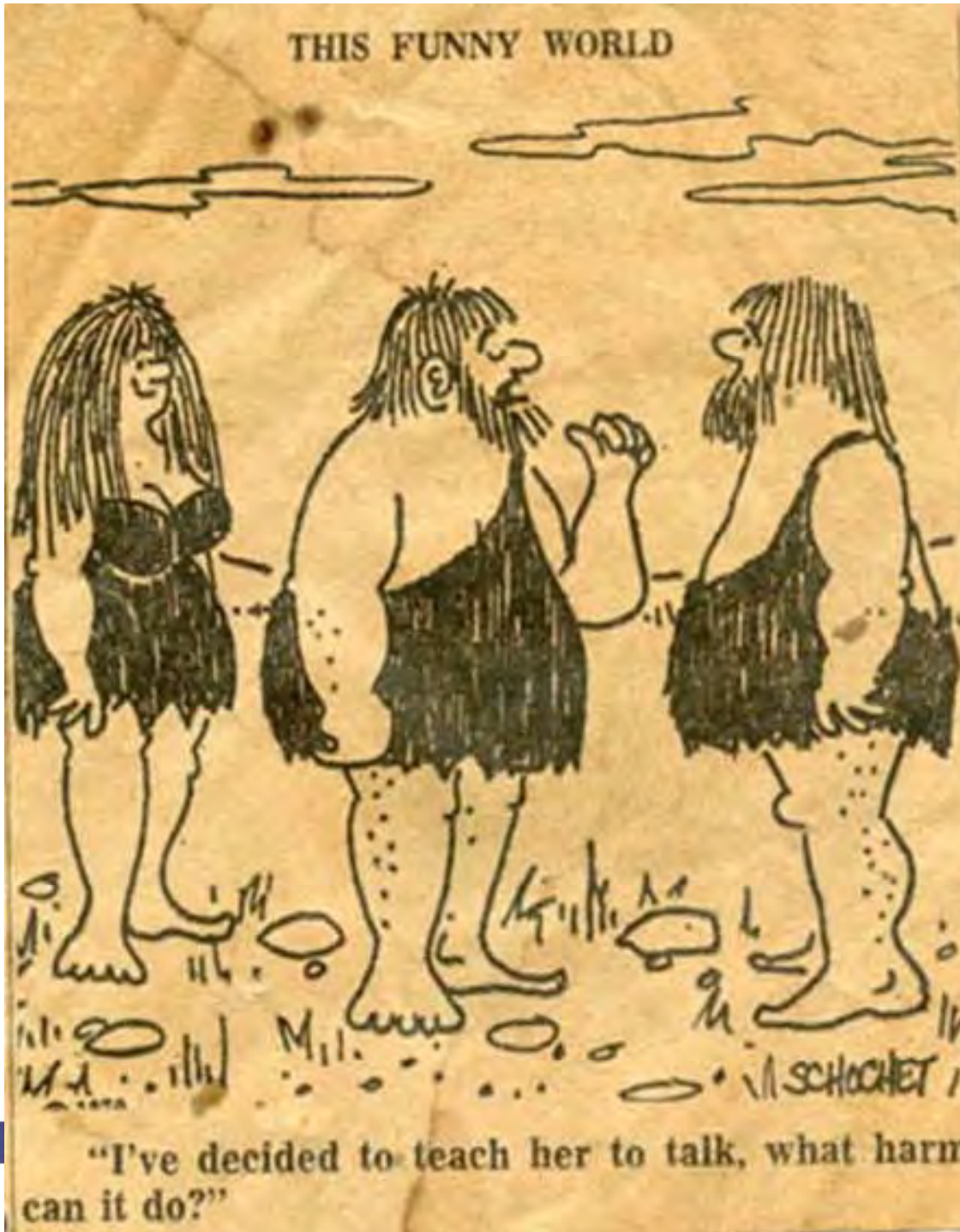


# Short term solution = Power Conservation Programme (PCP)

Eskom is developing the PCP on behalf of National Government to address the energy crisis



THIS FUNNY WORLD



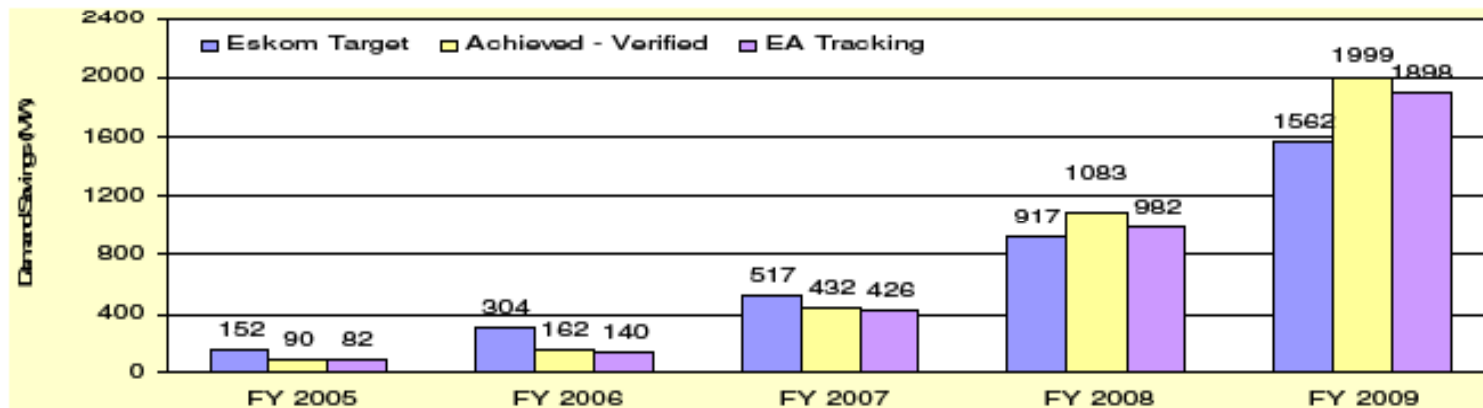
"I've decided to teach her to talk, what harm can it do?"

# Energy Efficiency in SA

Yesterday, Today, the future



1990 - 2002	2003 - 2005	2006-2009	2010 - 2015
<p><b>Market Building</b> to address excess capacity. Focused on converting processes from liquid fuel to electricity. Retail brands established to target specific market segments</p>	<p><b>Load Shifting</b> to address growing peak demand. Focused on municipal ripple control and industrial load control with time of use tariffs</p>	<p><b>Energy Efficiency</b> to address energy shortage. (Primary focus on large scale roll-out of energy efficient lamps (CFLs) in the residential sector)  <b>Power Alert</b> to inform customers of system conditions  <b>Demand response through DMP</b> to reduce peak demand dynamically to avoid load shedding  <b>Suspension of new connections</b>                      Introduction of <b>Voluntary Energy Conservation Scheme</b> with Eskom Top 250 customers</p>	<p><b>Energy efficiency</b> to address energy shortage  <b>Growth management</b> to manage rate of demand increase  <b>Demand response</b> to reduce demand dynamically to avoid load shedding  <b>Increasing energy productivity</b> to derive as much benefit from available capacity  <b>Customer adaptation</b> to increase national resilience to supply issues</p>



2009/10 expected savings of 432MW and 428GWh





# Processes of Implementation



Standard offer/Customer Offer

Paying for savings at predetermined rate

ESCo Programme

ESCo submitting proposals and execute

Standard Product

Funded programs to encourage energy efficiency in communities – e.g. CFL's

Rebate Programmes

Incentives given to encourage energy saving e.g. Solar water heating

Energy Advisory Services

Customers encouraged to fund own energy efficiency projects through self funding schemes but savings claimable by Eskom

# Benchmarks

<b>Programmes</b>	<b>Offer</b>
Lighting & HVAC	Up to R5.2m/MW
Hot Water	Up to R6.3m/MW
Demand Response	Up to R3.5m/MW
Compressed Air	Up to R4.4m/MW
Process Optimisation	Up to R5.2m/MW
Other	Up to R5.2m/MW

# Change Drivers – Customer environment

- **Customer environment (enforced by legislation)**
  - **Price increases**
  - **Energy conservation scheme**
  - **New connections/upgrades**
  - **Power factor correction**

# Severe power shortage



Current global economic downturn has given only a temporary breathing space

South Africa will experience a severe power shortage over the next 4 to 6 years

Eskom's New Build and return to service strategies will deliver power necessary in the future, BUT efforts will only realise from 2012 onwards

# “Committed to Conserve Power for All”

## Go easy on energy

Leaving your **computer** on overnight wastes as much energy as you would use **making 800 A4 photocopies**.

Leaving the **lights on** in a conference/meeting room overnight wastes sufficient electricity to make **1000 cups of tea**.

TVs, DVDs and video machines left on "**stand by**" continue to use at least **HALF the energy** that is used when switched on.

**Overfilling your kettle** can waste enough electricity to run a TV for **26 hours**

**Recycling 1 ton of paper** (400 reams) saves **15 trees**, **2,5 barrels of oil**, **4132 kWh electricity**, **2,26m<sup>3</sup> of landfill space**, **31319 gallons of water** and prevents **26.8 kg air pollutants** from reaching the atmosphere.

## Makes you think, doesn't it?



# "Committed to Conserve Power for All"

*"Energy Efficiency is the most obvious, perfectly clean, remarkably cheap, surprisingly abundant and immediately available renewable energy resource"*

Time Magazine Jan 2009



*"The cheapest kWh is the one that you don't use."*

EE Informer

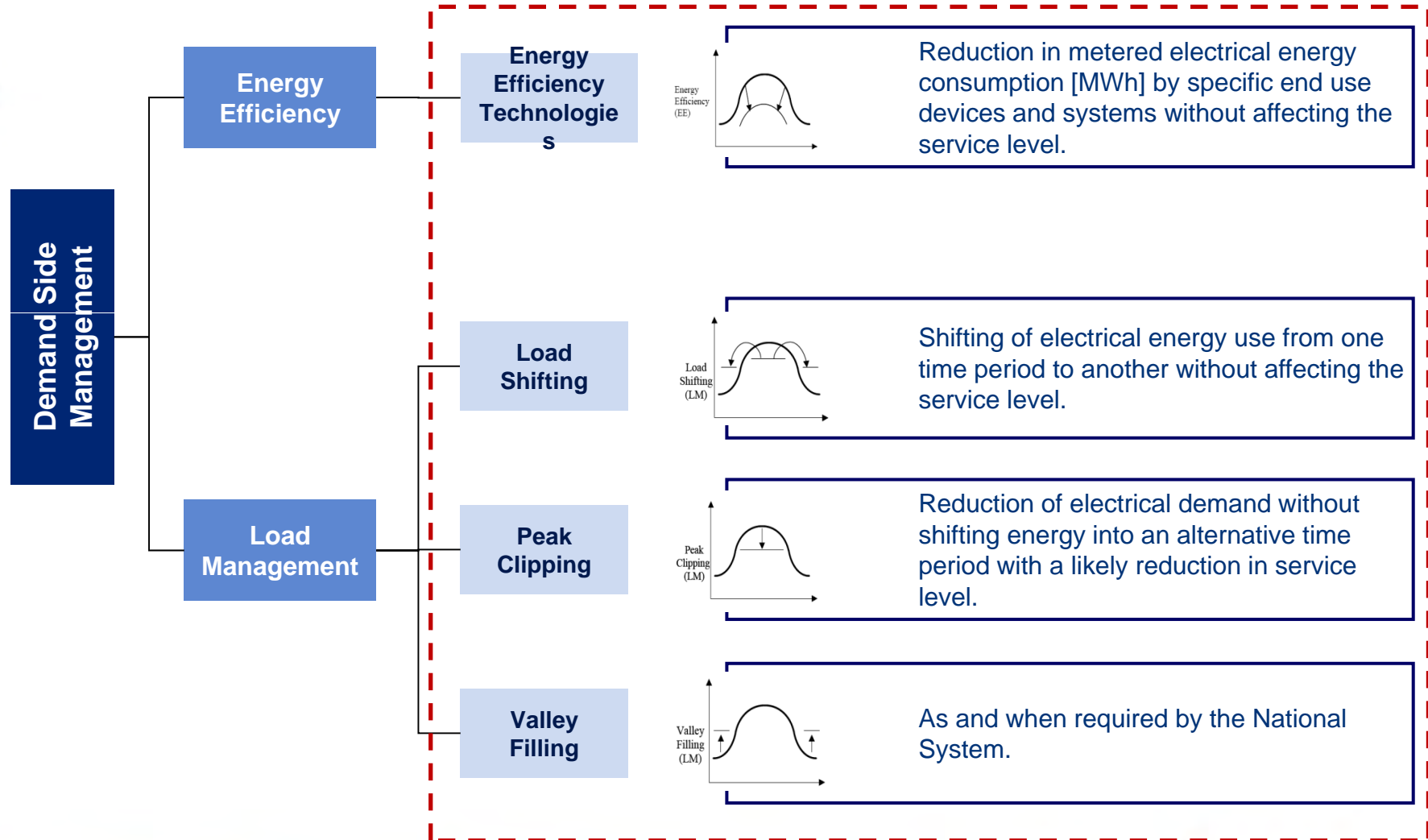
# “Committed to Conserve Power for All”

*“The cheapest kWh is the one that you don’t use.”* EE Informer





# The focus of the South African DSM programme is on Load Management and Energy Efficiency



# What is energy efficiency?

- ✓ Using energy in a **sustainable manner**
- ✓ Avoiding **unnecessary waste** of energy in our day-to-day activities
- ✓ Saving energy by using hot water sparingly, making **small changes** to the way we use our electrical appliances
- ✓ Using less energy over **peak time** where the demand on energy is at its highest
- ✓ Seeing energy in a new way – as a **valuable resource** that needs to be conserved

# Monthly electricity consumption monitoring - now/low cost saving opportunity

## Monitoring

- is the key to identifying energy-saving opportunities.
- Installing sub-meters can help with knowing how your energy is used.
- Metering also helps one to monitor energy-saving procedures and see the result after making changes.
- There are many types of different power meters on the market today.
  - a simple meter which can be plugged in series with the monitored equipment
  - Or highly technical units wired into the switchboard and connected to a computer which records everything and analyse the recorded data.

One has to analyse the data and try to eliminate or improve main users, so that power consumption is reduced. (Specialist help may be required.)



**Suggested locations for sub meters are:**

Kitchen	HVAC
Rooms	Lights
Laundry	Outside lighting
Public areas	Hot water supply

# How can one save?

- Hot water – no/low-cost solutions
  - Reduce thermostat's temperature to 55 - 60°C
  - Installing a low-flow showerhead or flow restrictors
  - Insulation of geyser with a geyser blanket
  - It is also essential to heavily insulate the first 3 metres of hot and cold pipework directly connected to the tank
- Training of staff

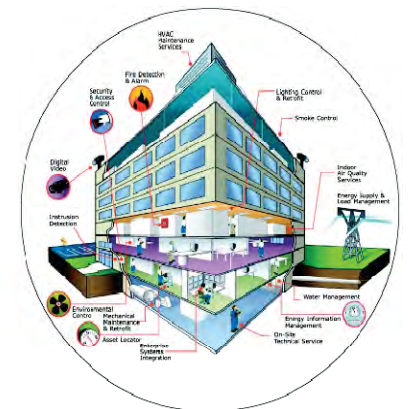
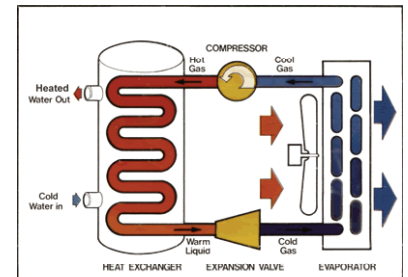


# Hot water – Higher cost solutions



# Energy Efficiency Solutions

- Hot water – Higher cost solutions
  - Solar water Heating
  - Heat pumps
- Energy efficient lighting
  - LED downlighters
  - Electronic ballast
- Building management system (BMS)
- Key card system,
- Motion and occupancy sensors
- Efficiency interventions on HVAC
- Maintaining air-conditioning at peak performance
- Appliances not left on standby
- Replace equipment with new EE rated equipment.



# Hot water – Higher cost solutions



## Solar water Heating

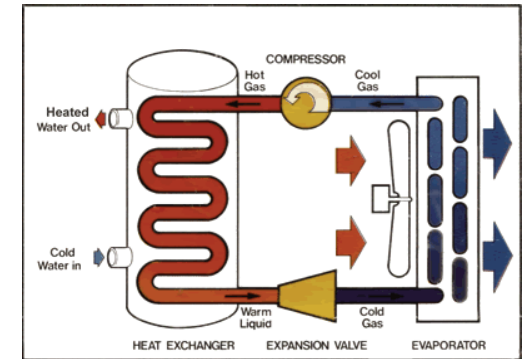
Most areas in South Africa average more than 2 500 hours of sunshine per year, and average solar-radiation levels range between 4.5 and kWh/m<sup>2</sup> in one day.

- Possibly solar energy's foremost application:
  - solar water heating can be used to completely replace existing electric hot-water systems.
  - Where large volumes of hot water are used frequently, it can augment an existing resistance heating system by 50% - 80%.
- Solar water heaters are between 40% and 80% efficient, depending on the type and the climatic conditions.
- A correctly sized and installed solar water heating system can provide up to 80% of hot water requirements.
- Everywhere, particularly where electric systems can be completely replaced
- Larger facilities with central systems also have the potential for easy retrofitting.
- Eskom SWH subsidy program: [www.eskom.co.za/dsm](http://www.eskom.co.za/dsm)

# Hot water – Higher cost solutions

## Heat pumps

- Provide an energy-efficient alternative to resistive heaters
- And is an alternative option to solar water heaters.
- Common examples are food refrigerators, freezers and air conditioners.
- Heat pumps can work anywhere in South Africa.
- Heat pump water heaters are approximately 3 - 4.5 times more energy-efficient than conventional resistive heaters, resulting in significant energy savings.
- A heat pump will also produce either chilled air or water, which can potentially be integrated into the air-conditioning system to further reduce energy consumption.



# EE Lighting – Low cost



## Energy efficient lighting

- Replace incandescent globes with new energy efficient compact fluorescents.
- A further benefit of CFLs is that they last up to 10 times longer than incandescent globes.
- All fluorescent strip lighting must be fitted with an electronic ballast.
- Replace inefficient fluorescent strip lighting with new efficient lights
- Replace incandescent down-lighters with new energy-efficient light-emitting diodes (LEDs) .
- LED downlighters are not good enough yet for general lighting, but they work very well as spotlights, signal lights or to enhance a path in the dark.



# Building management system (BMS)



## Building management system (BMS)

- Installing an energy management system as part of a building management system.
- When properly integrated into a facility, BMS can result in the following benefits:
  - Optimised energy consumption
  - Provide alarm systems so as to take corrective actions
  - Monitor and control indoor conditions
- The BMS can typically control the following applications:
  - HVAC and lighting control
  - Variable speed drives
  - Safety & security solutions
  - Security management
  - Zoned HVAC settings
  - Emergency lighting
  - Intrusion alarm systems
  - Water management and control
- A fully optimised BMS can reduce energy cost to the extent of 15% - 20%, as compared to a building without BMS

# Key card system



## Key card system

- Reduce unnecessary consumption by switching off lights in unoccupied rooms
  - Key-card energy-saving devices can save energy in unoccupied rooms by shutting off power to electrical appliances and air conditioning.
  - The systems are mostly card operated, which only work with the door access card of the room.
  - It has a high comfort rating, because it enables one to switch off all lights and appliances with one switch before leaving the room.
- To be able to charge electrical equipment such as laptop computers, digital cameras and mobile phones, one should consider leaving a socket live and clearly label it for “charging purposes only!”
- Please note that, if you have a mini-bar/fridge in the room, it should have a high efficiency rating and you should power this continuously.
- A system like this is not easily installable.

# Heating, ventilating and air conditioning (HVAC)



## Efficiency interventions on HVAC

- Efficiency interventions exist on the HVAC system such as:
  - economy cycle
  - cold-air re-use
  - heat recovery
  - evaporative coolers
  - night temp cycles
- Opportunities for mechanical system retrofits for HVAC systems are numerous and varied due to the wide assortment of heating and cooling systems and supporting equipment used in buildings.
- Unlike many lighting retrofits, it can be difficult to determine the energy savings that result from mechanical system retrofits or replacements.
- Savings are often highly dependent on both the weather and the efficiency of the existing system (which can be challenging to measure).
- Some of the possible interventions are listed below:
  - Use ambient air. Even in summer, early morning or -evening air is cool.
  - Using an economiser setting to draw in this cool air allows the HVAC system to utilise outdoor air more efficiently.

# Maintaining air-conditioning



## Maintaining air-conditioning at peak performance

- The performance of HVAC equipment often deteriorates over time.
- Maintenance programs can bring substantial, cost-effective savings (achieving median energy savings of 23%).
- A typical maintenance program should include:
  - Clean evaporator/condenser, fins and filters and replace filters in air-conditioners regularly.
  - Check for air leaks. Ensure no air is leaking from air ducts.
  - Seal air leaks around doors and windows.
  - Insulate air ducts and pipes to reduce excess heated or cooled losses.
  - Check for a rise or drop in temperature in ducts and pipes. If there is a significant temperature change, upgrade insulation.
  - Check thermostat calibration.
  - Check that sensors and controllers are operating correctly.
  - An operational check on chillers and boilers, which can be done for a small cost, will indicate how efficiently the equipment is operating and what areas need attention.

# ■ Appliances not left on standby



## Appliances not left on standby

- Awareness programme for staff and students
- Most modern appliances actually use electricity when they are switched off, which is more commonly known as standby power consumption.
- These “standby loads” occur in most electrical appliances, such as VCRs, televisions, stereos, computers and kitchen appliances.
- However, switching the appliance off at the correct place, or unplugging the appliance can help avoid paying for standby electricity.
- Alternatively using a multi-socket power adaptor can make it easier to turn off several appliances at once.
- Many people are perhaps unaware that appliances on ‘standby’ actually consume electricity needlessly.
- It is therefore important to make staff and guest aware to switch these appliances off when they are not in use and a significant amount of energy can be saved.
- American research has shown standby losses to be between 6% and 26% of annual electricity consumption in the home.

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# Conclusion

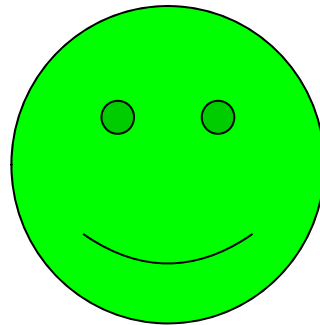
- The country can deal with the electricity emergency if we all pull our weight
  - We have a plan:
    - Long-term capacity expansion
    - Short-term demand reduction
    - Medium-term energy saving amongst all users
  
- Create an energy-efficient society that values electricity as a precious resource
  
- Nation-wide load shedding is not our preferred option
  - Need to reduce demand to manage the stability of the system
  - With our key focus on generating issues
  
- Load shedding can be avoided if customers reduce consumption and maintain their lower consumption

# Conserving the environment



75 W incandescent bulb = 15 W energy-efficient light bulb

- life span of 6 000 hours
- saving of 1100 litres of water
- and 430 kg coal



**Conserving the environment through energy saving**