Energy and Water Conservation

Conserve water, conserve energy and save lives!

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South African Water Situation

- SA is a water scarce region with increasing competition for water amongst users;
- Effective and efficient water management is required to preserve the water resources;
- Water prices will increase to reflect its scarcity and economic value
- DWAF's policy has been to promote WCWDM:
  - New Regulations: Section 26(1) (a) (b) (e) (g) & 26 (4) of National Water Act
  - Waste Discharge Charge System
  - Water Allocation Reform
  - Minister has right to set administratively economic charges for water, if deemed necessary.
  - Launch of WC/WDM Programme in 2007
  - Focus on power generation sector

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*DWAF: Department of Water Affairs and Forestry

Eskom's Water Use

- Eskom is the single largest water user in South Africa- 2% of total water resource;
- Eskom has been a pioneer in developing technologies related to water conservation and water demand management:
  - Kendal and Matimba Power Stations amongst the largest dry cooled power stations in the world;
  - Some wet cooled plant performance is amongst the best in the world e.g. Lethabo Power Station performance at 1,76 l/USO.
  - Mine water use at Tutuka and Lethabo power stations
- Large dependence on wet cooled power stations- approx 64% of current output;
- Typical water usage:
  - Wet Cooled: 50 million cubic metres per annum
  - Dry Cooled: 3.5 million cubic metres per annum

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Water and Energy Interdependency

The relation between water and energy can be described by the following:

- **Consumption**
  - **The consumption of water and electricity have similar profiles**
  - **High water consumption results in high electricity use**
- **Electricity Generation**
  - **2007 Eskom annual report: 1.35 litres/kWh**
  - **2008 target: 1.36** litres/kWh
- **Savings**
  - **Direct savings – these are savings on the user end**
  - **Indirect savings- these are savings on the supplier (pumping etc.)**

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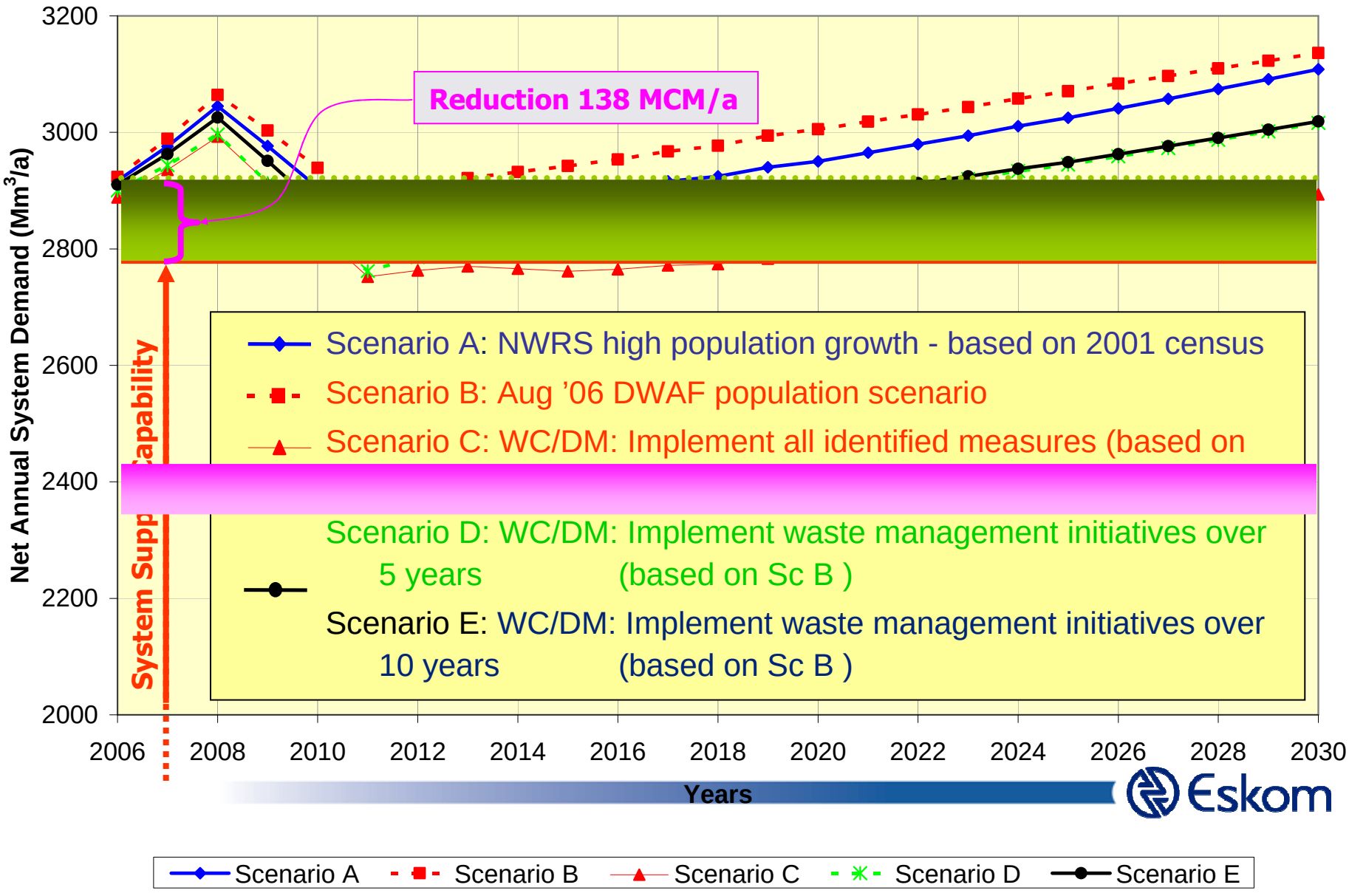
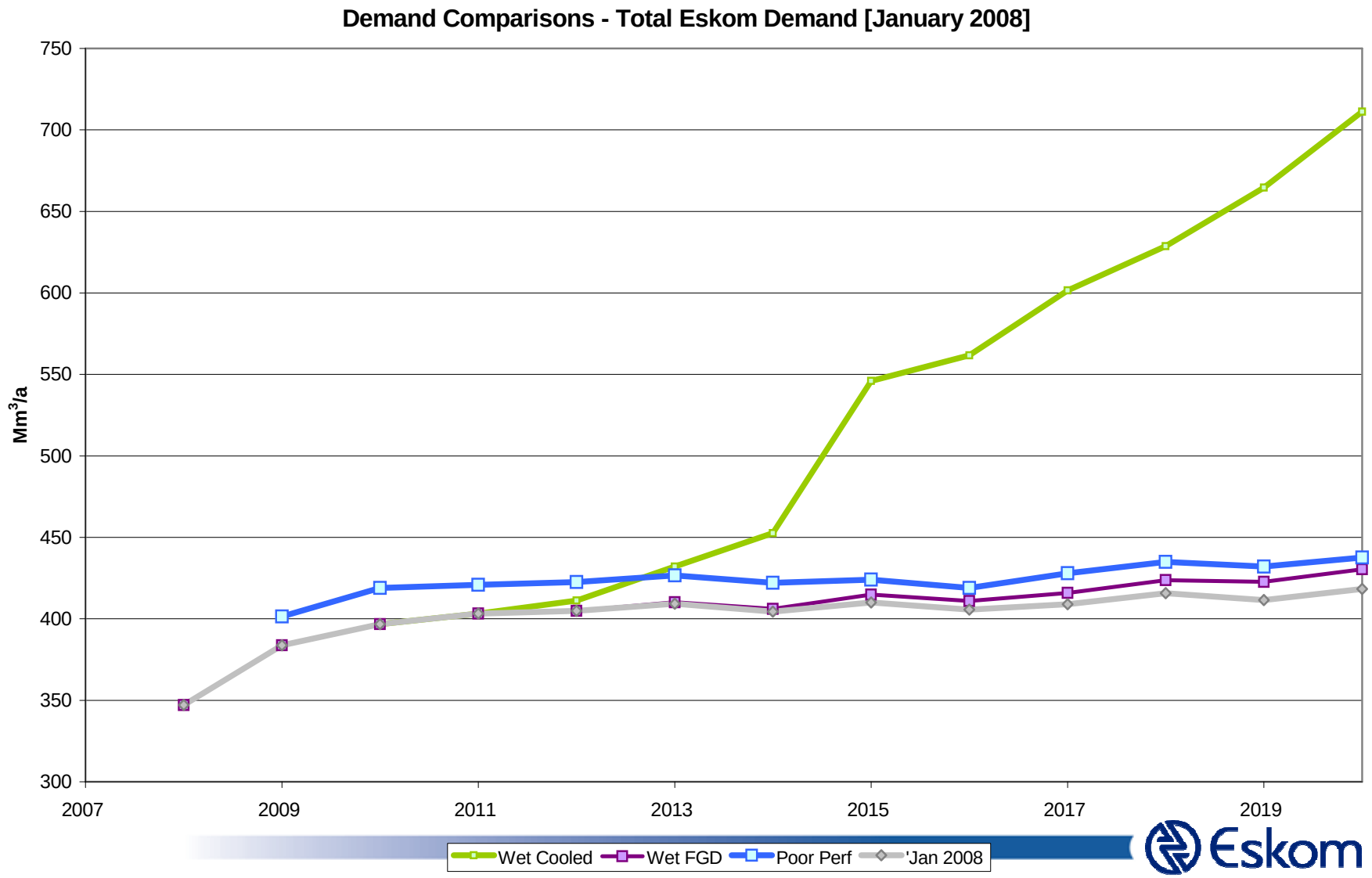
System Supply Capability vs Net Demand (Vaal Dam)



VARIATIONS TO WATER DEMANDS



Purpose of the MoU

- Eskom to negotiate and conclude a Memorandum of Understanding with DWAF on Water Conservation and Water Demand Management for a period of five years
- Develop a strategic partnership with DWAF to foster water conservation and water demand management in the power generating sector in order to maximise resource utilisation in the national interest
- Develop a strategic partnership with DWAF to foster Energy Efficiency and Demand Side Management in the Water Sector

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Objectives of the MoU

- Share, inform and guide regulatory initiatives on water management within the power generation sector;
- Exchange information regarding policies, strategies and developments in the field of water use and conservation and climate change;
- Joint research, co-operation and agreement in the areas of best water management practice and water use performance improvement;
- Promote, encourage and support good water management practices;
- Develop benchmarks for the power generation sector and implement plans to meet set targets;
- Explore synergies between Eskom's Energy Efficiency and Electricity DSM Programme and DWAF's WCWDM Programme.

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DWAF Objectives in Collaboration

Short Term

- Where DWAF is implementing WC/WDM initiatives, associated DSM opportunities should also be implemented
- Where Eskom is implementing DSM initiatives, associated WDM opportunities should also be implemented
- Where Eskom and DWAF are scoping projects, defining terms of reference and appointing service providers for energy DSM and WDM the processes must provide for an integrated engagement of potential DSM and WDM opportunities

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DWAF Objectives in Collaboration

Medium to Long term

- Develop and implement an integrated water and energy conservation program. There are potentially significant opportunities for yielding the benefits of scale and avoidance of duplicating effort and resource use
- Share platform for spreading the demand management, efficiency and conservation message

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MoU Principles

- Joint decision making on WCWDM projects and initiatives to be undertaken;
- Sharing of expertise on various areas of knowledge in the fields of WCWDM and EEDSM as approved by each organisation's governance structures;
- Joint research and development into WCWDM and EEDSM initiatives;
- Joint awareness, education and marketing of WCWDM and EEDSM;
- Funding approvals to be vetted by each organisation's governance structures;
- Collaborative support by the parties in executing their individual functions and primary mandates;
- Confidentiality of information and Intellectual Property will be in accordance with each organisations Access to Information Policy

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Governance Structure

- Joint Eskom and DWAF Steering Committee (Co-chaired)
- Three Task Teams comprising representatives from both Eskom and DWAF:
  - Task Team 1: Effective and efficient use of water and energy by the power generation sector;
  - Task Team 2: Technical Interventions with regards to DWAF's Water Conservation and Water Demand Management Programmes (WC/WDM) and Eskom's Energy Efficiency and Demand Side Management (EEDSM) aimed at end users;
  - Task Team 3: Marketing, Communication, Education and Awareness Creation of DWAF's Water Conservation and Water Demand Management Programmes (WC/WDM) and Eskom's Energy Efficiency and Demand Side Management (EEDSM) programmes.
  - Task Team 4: WCWDM and EEDSM for Eskom Key Customers and DWAF Key Customers

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Introduction

- **Project background**
  - **MOU signed between DWAF minister and Eskom CEO.**
  - **Project entailed joint initiatives between Eskom and DWAF to achieve water and electricity savings.**
- **Task Team**
  - **Members: DWAF and Eskom employees.**
  - **Sectors: Generation, Agriculture and Super-sector (consisting of Municipalities, Commercial and Residential).**
- **Objectives**
  - **Investigate potential savings: Water and Electricity and relevant technology used**
  - **Investigation was done in the Super-sector (e.g. Municipalities, Commercial and Residential sectors)**
  - **Propose solutions through best practices**
  - **Document the findings into a report**

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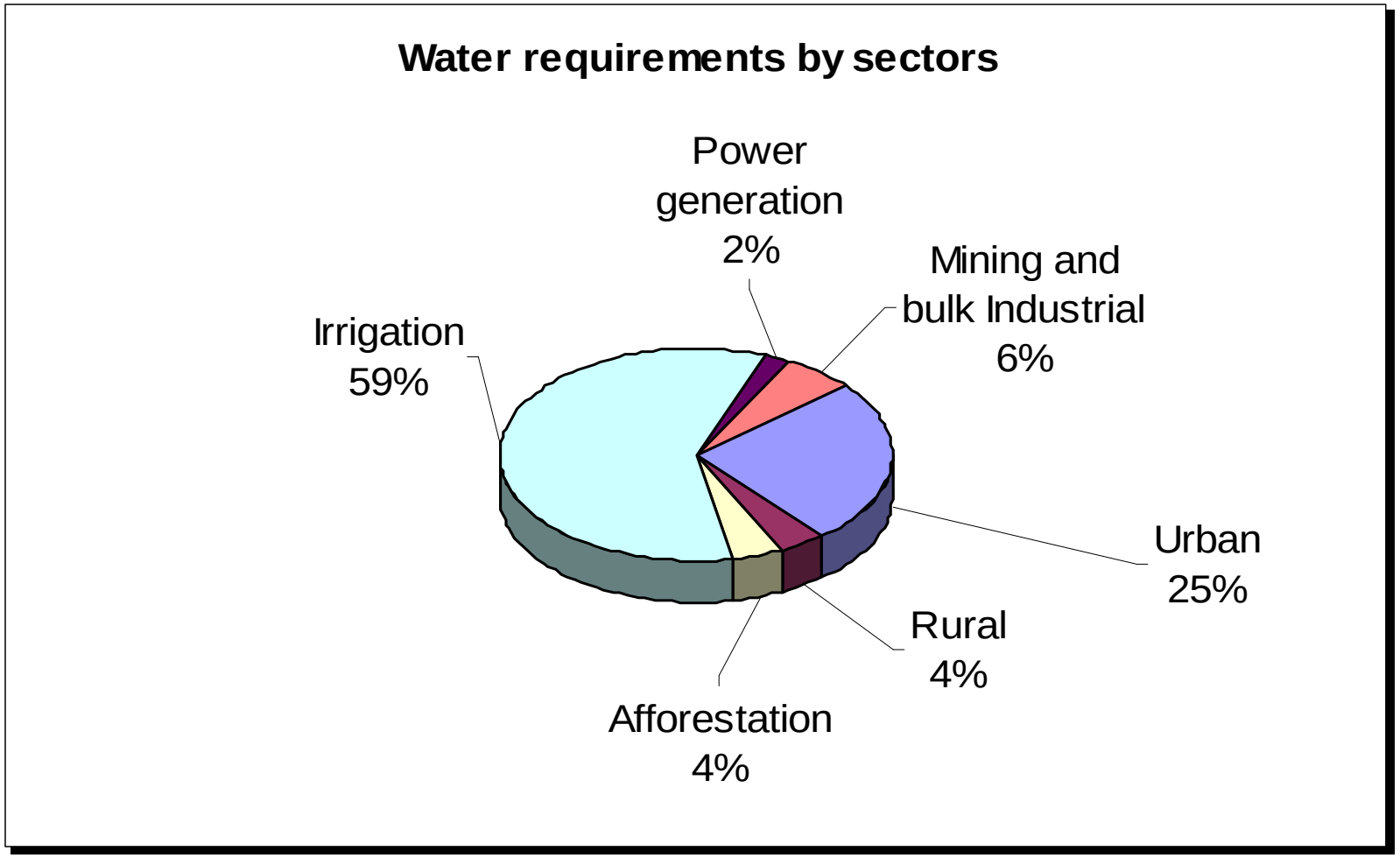
Water Requirements Statistics



Source: DWAF Handouts

Municipalities: water and energy savings potential

In South Africa municipalities are mostly both suppliers (utilities) and consumers of water (public facilities e.g. stadiums, parks)

- **Typical utility like structure of municipalities**
  - **Waste water treatment plants and their distribution system**
  - **Water supply and distribution systems**

- **Typical consumer structure of a municipalities**
  - **Commercial**
  - **Residential**
  - **Industrial**
  - **Agricultural (in some municipalities)**

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Municipalities: water supply and distribution

Any distribution system has losses, and in water supply and distribution system losses are due to:

- **Pipe leaks, mostly underground pipes because of their inaccessibility**
- **Breaks - usually pump breaks**
- **Inefficient water meters**
- **End-use losses**

All of the above losses have their respective amounts of energy losses connected with them

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Municipalities: water supply and distribution

- **These are both Water and Energy Efficient options.**
  - **Water leaks systems (usually for big water leaks in pump stations)**
  - **Install automatic section valves- for quick sectionalizing when there are leaks**
  - **Monitoring system for major distribution pipes - via Ethernet communication systems to analyze faults, also helps with faulty meters**
  - **Well built water collection and drainage systems**

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Municipalities: Waste water treatment plants

Drivers of high electricity consumption in waste water treatment processes.

- **Characteristics of raw water e.g. sewage, ground water and surface water**
- **Plant size, e.g. energy consuming machinery such as motors etc**
- **Treatment process with various stages of treatment**
- **Distance of elevation of the treatment plant in relation to the distribution areas**
- **Unaccounted water losses**

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Municipalities: Waste water treatment plants

Energy Efficient and best practice options:

- **Retrofit options:**
  - **Pump motors – for feed pumps**
  - **Fans – for air blowers**
  - **Lighting (indirect savings)**
- **Pipe leaks sensors and SCADA systems through out the systems**
- **None-corrosive agents must be used when treating waste water – to decrease pipe wear**
- **In house filter-tanks to prevent excessive evaporation during the day**

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Commercial: Water and electricity consumption

- **Water**
  - **Water use can be interior or exterior**
  - **Interior : cooling, flushing, drinking, laundry, bathing, dishwashing, cleaning and cooking**
  - **Exterior use is lawn watering**
- **Electrical Energy**
  - **Commercial sector uses about 10 % of the total electricity consumption**
  - **Electricity consumption is through Lighting, cooling and heating systems**

Commercial: Water and energy savings potential

- **Boilers**
- **Cooling systems**
- **Kitchen & bathroom**
- **Outdoor water usage**

Commercial: Water heating and cooling systems

Some of the best practices options

- **Boilers**
  - **Energy savings: Repairing leaks, insulation, condensate pumps**
  - **Water savings: make use of water recirculation and re-use**
  - **Water and Energy: Reduce blow-down, use heat pumps**

- **Cooling system**
  - **Water and energy saving: closed loop cooling system with the use of energy efficient equipment**
  - **Further savings achieved with good maintenance of the system**

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Commercial: Kitchen, bathrooms and outdoors

Some of the best practices options

- **Kitchen and bathroom**
  - Sensors for dishwashers
  - Pre-rinse methods
  - Ozone washing (laundry and dishes)
  - Use high efficiency equipment
  - Maintenance (check for leaks)
  - Waste water treatment
  - Sensors for faucets and low flow aerator
- **Outdoor water usage**
  - water lawn in the morning than in the afternoon

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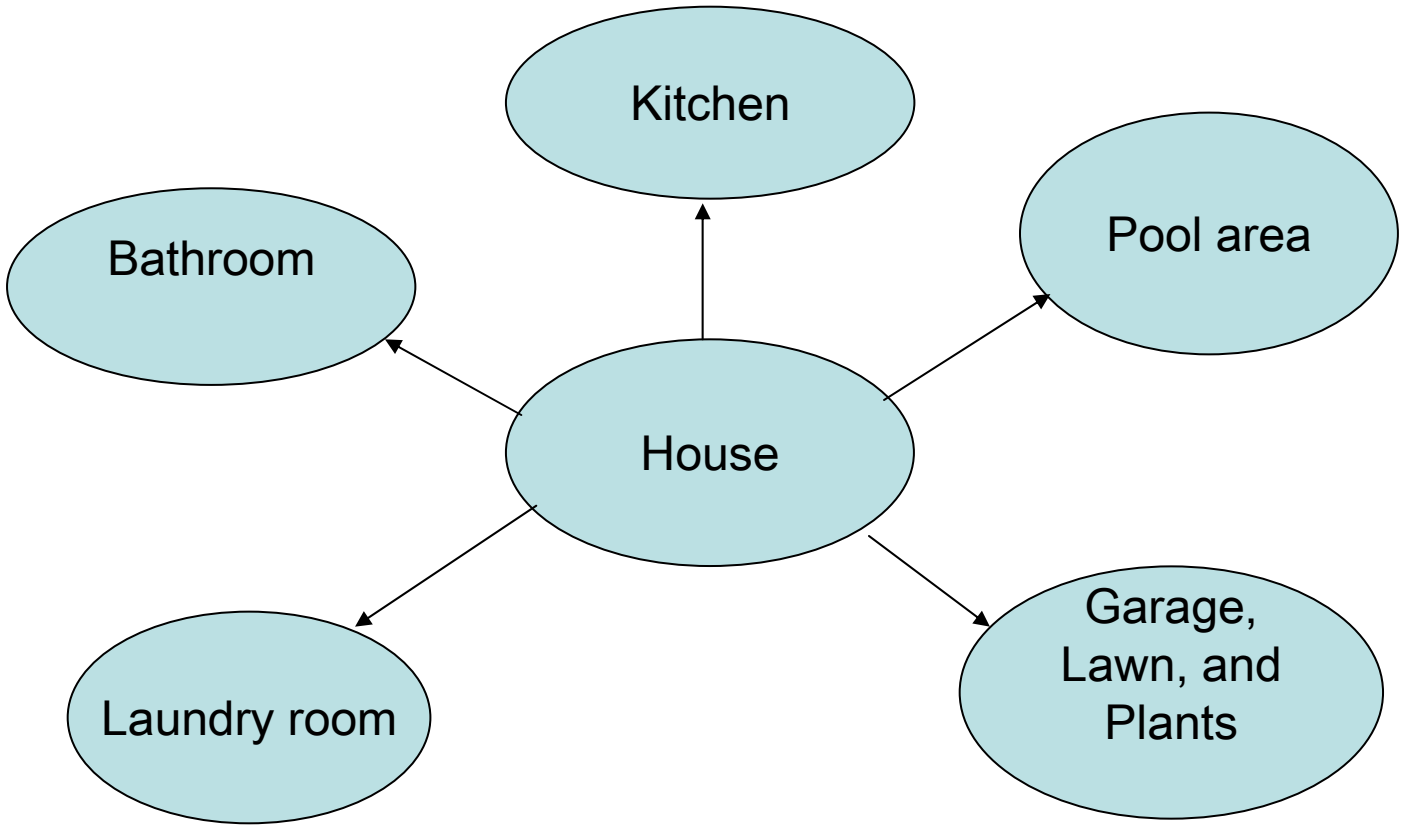
Residential: water and electricity savings potential



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Residential: Kitchen

- **Sinks**
  - **Using low flow faucets,**
  - **Fixing leaking taps**
- **Dishwashers**
  - **By washing dishes at full load energy can be shaved,**
  - **Reducing *leakages* on taps**
- **Dish washing**
  - **By washing by hand less water will be used**

Residential: Toilet, bath and shower

- **Bath vs. Shower:**
  - Shower reduces amount of water needed or a wash
- **Shower**
  - Install a low-flow shower heads
- **Sink**
  - Sensor taps for hand wash.
  - Close tap while tooth brushing
- **Urinals**
  - Install ultra-low urinals
  - Install No-water urinals
- **Dual flush toilets**
  - Low flush for urinating
  - High flush for the heavy substance

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Residential: Swimming pool and Jacuzzi

- **Swimming pool**
  - **Timer installation for less water filtering hours**
  - **Cover when not in use, to prevent excessive evaporation**
- **Jacuzzi**
  - **Timer installation**
  - **Water loss can also be reduced by covering the pool and Jacuzzi.**

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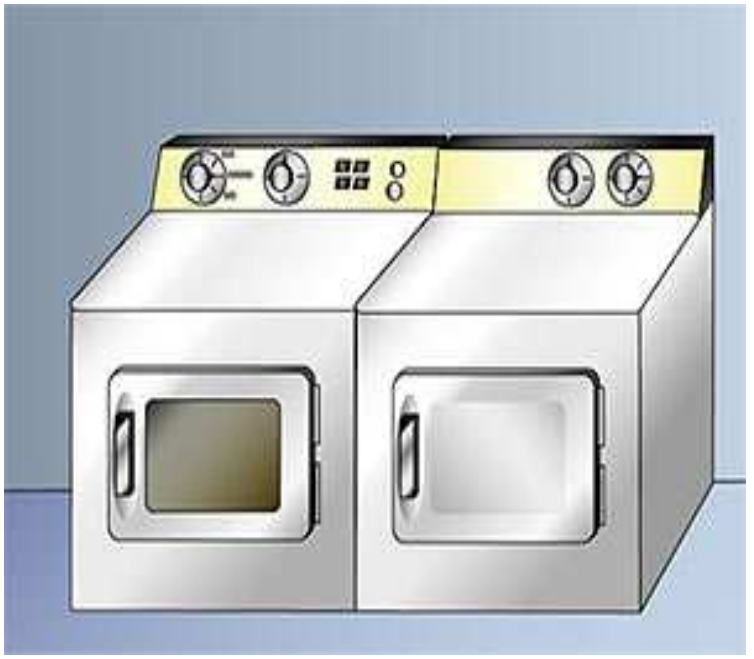
Residential: Garage, lawn and laundry

- **Using a bucket and not a hose pipe to wash your car**

- **Watering plants at night/ evening**
  - **This will reduce water evaporation from the plant due to the sun's rays.**

- **Horizontal-axis clothes washers:**
  - **Use less water.**
  - **Preferred over top loaders.**



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Residential: General best practices

- **Pre-wash cycle in washing machine**
  - **Skip the pre-wash cycle on your washing machine if your clothes are not particularly dirty.**
  - **This can save up to 20 percent electricity.**
- **Geyser and pipes insulation**
  - **Reduce electricity by maintaining the water temperature.**
- **Geyser thermostat set around 55-60 degrees.**
  - **Less cold water used to decrease the temperature.**
  - **Less energy used to heat up water**
- **Reduce running water from the tap to the drain**

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Conclusion

- **Electricity and Water conservation is essential for all the sectors.**
- **Electricity and water conservation are achieved through the use of efficient equipment and systems.**
- **Best practices and adaptation of efficient technologies mentioned in the presentation save both water and electricity.**
- **For customers the electricity and water bills will be reduced as a result employed best practices.**

Thank you!

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