Eskom
Commercial properties
Fact Sheet

Eskom

Introduction 1

Eskom's energy supply is still severely constrained and future demand is predicted to exceed supply unless energy consumers reduce their consumption. With the local commercial property sector currently consuming up to 15% of Eskom's energy output, commercial properties need to find ways to reduce their consumption, not only in the long term, but also in the immediate term.

While there are many energy-efficient technologies available to this sector, property owners often find it difficult to decide on the best approach that will continue to meet their energy requirements, especially when weighing up the initial outlay cost against cost savings achieved as a result of energy savings.

Eskom's energy advisory service, in partnership with energy service consultants, have conducted numerous projects in terms of energy efficiency retrofits. The intelligence gained from these case studies has enabled Eskom to determine which technologies produce the best results in reducing energy consumption, and ensuring favourable payback periods.

Property and portfolio owners can benefit from making contact with Eskom's advisory team, who now have years of experience in this space.

Interested parties can contact the advisory service on 08600 ESKOM (08600 37566), and log a query for an energy advisor in your area to contact you.

The following technologies and related behaviour adaptations currently form part of Eskom's commercial sector energy efficiency focus:

Lighting 2

Lighting accounts for a substantial portion of the monthly energy consumption and costs of commercial buildings. In fact, lighting is estimated to be responsible for between 37% and 45% of electricity consumption in office buildings.

Over the years, commercial lighting solutions have evolved to meet the aesthetic needs of a modern building layout and design, as well as meet energy efficiency and health and safety requirements.

The large variety of components available today means that there are lighting solutions to fit almost any context.

The following steps can be taken to improve the energy efficiency of an organisation's lighting:

2.1 **Switch to energy-efficient lighting**
Replace magnetic ballast luminaires with electronic ballast and energy-efficient lights such as T5 fluorescents and LED tubes. Thanks to advancements in quality and colour rendering of LED lights, they can now be used in a much broader range of applications. LED lights use dramatically less power while providing better light and reduced flicker. They also last much longer. Energy-efficient lights run at much lower operating temperatures than traditional lamps. Because they run cooler, there is less heat for the air conditioning system to deal with, and light fittings and cables do not deteriorate as quickly.

2.2 **Label light switches.** Clearly label light switches so that employees know which switches control which lighting zones. If they know where to switch off, they will be more inclined to do so when they leave an area unoccupied. This is especially relevant for employees working outside of normal office hours.

2.3 **Go light on colour.** Choose lighter colours for ceilings, walls and surfaces. This helps reduce the amount of artificial light needed.

2.4 **Light up enclosed spaces separately**. Enclosed spaces should have individual light switches so that they are not left lit unnecessarily. These switches can be used in conjunction with room occupancy sensors.

2.5 **Install occupancy sensors.** Occupancy sensors control lighting based on occupant detection. These can be used to control lighting in intermittently occupied areas such as meeting rooms, toilets and print rooms.

2.6 **Deploy daylight sensors.** Use day-light sensors to brighten, dim or even switch off lights according to natural light levels as they change throughout the day. This will reduce operating and energy costs. The influence of artificial and natural lighting has been intensively studied, and it is proven that exposure to daylight and productivity is strongly related.

2.7 **Use programmable control systems.** Lighting control systems can switch off lights automatically or step-down lighting levels for nighttime security alternatively, reduced occupancies.

2.8 **Reduce consumption of down lights.** Switch to LED down-light lamps for down lighting applications. LED down-lights are noticeably more energy efficient compared to halogen. While an LED down light might be initially more expensive than Halogen globes or compact fluorescent light bulbs, you can potentially save up to 90% on your energy consumption. The additional benefits of energy efficient LED Down-light lamps;

- Enhanced brightness and dimmable at lower wattage as compare to traditional lamps
- Low temperature and cooler environment
- Halogen down lights have an estimated lifespan of no more than 1000 hours, whereas LED light bulbs can last anywhere from 25,000 to 50,000 hours.

Heating, ventilation and air conditioning (HVAC)

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Another area of energy consumption that Eskom has studied is that of climate management in buildings (HVAC). Workers in offices and shops work most effectively and comfortably when the ambient temperature is kept in the "golden zone" - between 18°C and 22°C.

In winter, when the temperature falls below this zone, the air in the building must be heated. In summer, when temperatures rise above 22°C, the air must be cooled until it drops to within the ideal zone.

Both heating and cooling are extremely energy-intensive. Several techniques are employed to reduce this load. Architects and construction engineers offer assistance in orienting new buildings to make optimum use of natural light, and in specifying the most energy-efficient sizes and orientation for windows and entrances, and with efficient surface cladding and construction materials.

When HVAC equipment is planned and installed, engineers are encouraged to

use ingenious methods of minimising power use. One such way, during the summer heat, is to "flush" the building with cool night air, dropping the temperature and giving it a cool start to the day.

The use of electronic sensors and controllers to switch off HVAC equipment in unoccupied parts of buildings and during night times and weekends sounds simple, but it is often overlooked. It is very effective in reducing the total amount of energy consumed by a building.

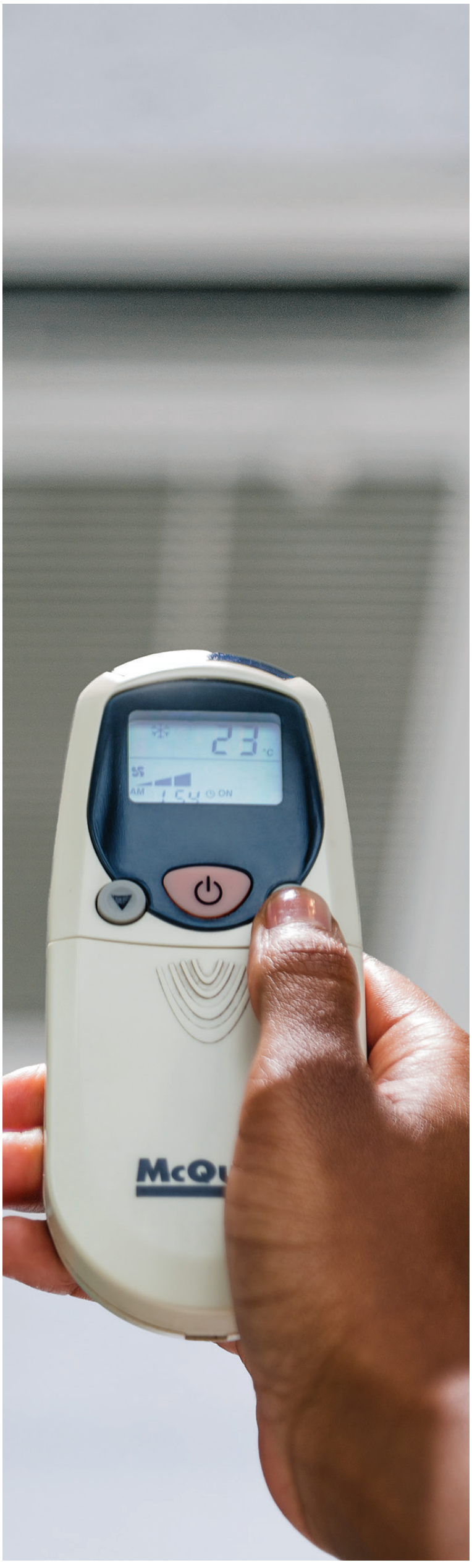
The following steps can be taken to improve the energy efficiency of climate control systems:

3.1 **Modify set points**. Choosing thermostat set points that stretch the upper limit in summer and lower limit in winter of the acceptable thermal comfort boundaries saves energy, e.g. 24°C in summer and 17°C in winter.

3.2 **Temperature of server rooms**. Increasing the set point in server rooms can save energy – some ICT equipment can tolerate higher than the recommended temperatures. Ensure controls are working well. Correctly functioning controls ensure that no energy is lost because unnecessary demands are made on HVAC equipment.

3.4 **Preventive maintenance programme**. A scientific comprehensive maintenance programme ensures that equipment works as efficiently as possible, makes it last longer and cuts operating and energy costs.

3.5 **Cooling tower maintenance**. A comprehensive cooling tower maintenance programme ensures chiller efficiency does not decrease.



3.6 **Re-set mechanical plant.** Rebalancing and recommissioning all plants ensures that systems operate as efficiently as possible and keep running costs at their minimum.

3.7 **Reset chilled water temperature**. Raising chilled water temperatures (e.g. to 12°C – 18°C) when conditions permit improves chiller system efficiency.

3.8 **Maintain ductwork.** Insulating ducts and pipes and repairing leaks in ductwork promptly keeps energy losses at a minimum.

3.9 **Zone controls**. Zoning air conditioning systems can improve energy consumption by ensuring that only relevant parts of a building are cooled. It also improves thermal comfort for occupants.

3.10 **Digital plant control**. Digital control systems can control and modify flow rates, compressors, pumps, fans, valves, etc., ensuring accurate and efficient use.

3.11 **Heat recovery.** Heat recovery systems transfer heat between inbound and outgoing airflo streams, reducing heating or cooling demands on inbound air.

3.12 **Solar boosted hot water**. Solar boosted hot water for kitchens, showers, etc. reduces energy use.

3.13 **Under floor air supply.** Air supply through a raised floor plenum (typically around 400 mm) ensures even air distribution and uses less energy than conventional ceiling ducts and grills.

Variable speed drives (VSDs) 4

A VSD is a system that controls the speed of an electric motor by controlling the frequency of the electrical power supplied to the motor.

VSDs are not as widely used as they should be. VSDs are not as widely used as they should be. Particularly in older installations, systems use constant speed motors combined with other equipment to manage the process flow and speed. This system is less efficient and consumes more energy than one that uses a VSD.

For example, in ventilation systems for large buildings, variable speed motors on fans save energy by allowing the volume of air moved to match the system demand. Variable speed drives are also used on pumps and other equipment to match the needed demand, thus ensuring that waste is kept to an absolute minimum.

VSDs are particularly suited to electronic control systems such as programmable logic controllers and computers. These systems are typically used in complex building climate control systems. By responding to inputs from various sensors in the building and adjusting the speed of relevant motors, the process can be kept at an optimum speed and wastage is minimised. VSDs are ideal for equipment with varying load conditions.

Hot water management 5

Commercial properties with facilities that have major hot water demands, such as kitchens, multiple ablutions, laundries etc. can save as much as 40 – 60% of their hot water energy costs by adopting more efficient water heating processes, and by reducing their consumption of hot water. Electric hot water cylinders, or geysers, are widely recognised as major consumers of electricity in buildings and homes. Supplying hot water to washrooms, canteens and bathrooms, the geysers waste significant amounts of energy at times when no one uses the water. Solar water heaters and heat pumps are both recommended by Eskom as energy-efficient alternatives to water heating using a conventional electric geyser. Eskom recommends that a customer consider their circumstances when choosing either one of the water heating technologies. The following points should be considered and discussed with the suppliers of a solar water heater or heat pump:

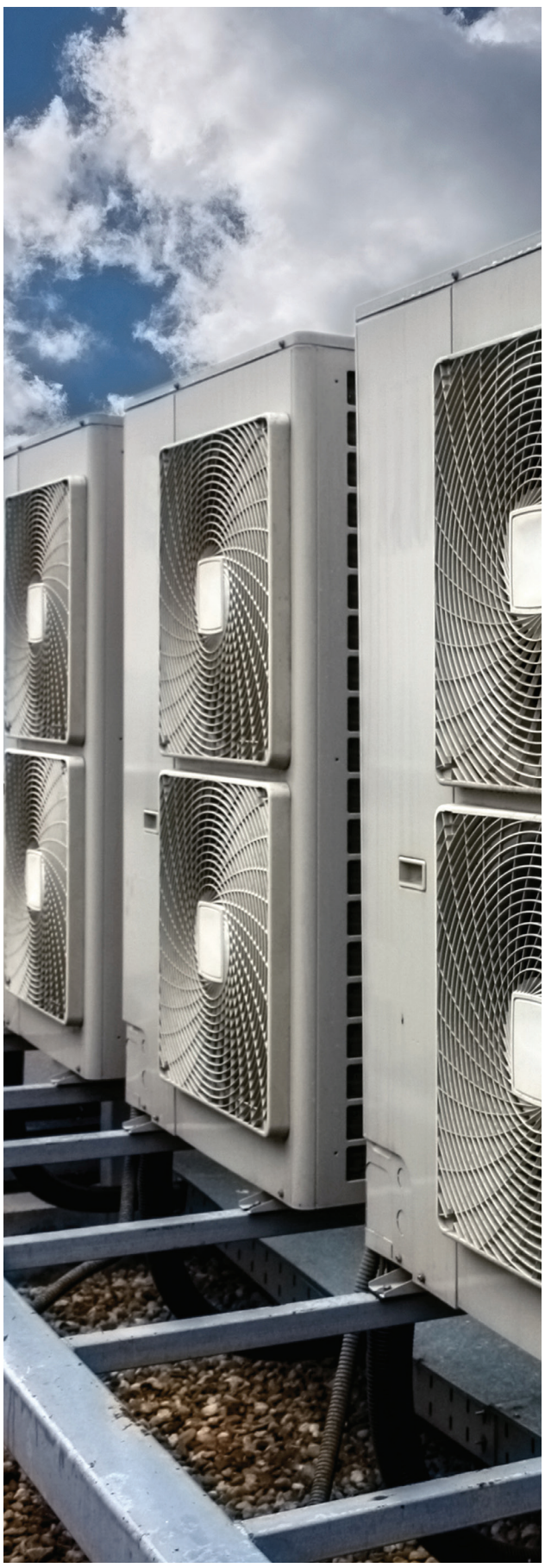
Type of facility – Space and location would have to be taken into consideration when looking at the appropriate technology. Solar water heaters and heat pumps have differing spatial requirements.

- Geographical location – Both technologies have limitations in terms of the climate/ weather experienced in a particular area. A customer would have to discuss their particular situation with the technology supplier in order to make an informed choice
- Maintenance – Both technologies have particular maintenance requirements to be taken into consideration and a customer would have to consider this when choosing the appropriate type of water heater. This must be discussed with the suppliers.
- Affordability – Capital, installation and maintenance costs vary for each technology based on size as well as location, and a customer would have to consider their financial situation when choosing the technology.

By installing either a solar water heater or a heat pump, customers will reduce their electricity consumption and save on electricity costs while still experiencing the same level of service as a conventional electric geyser.

5.1 **Solar water heating**. Solar water heating has many benefits for building projects and for society. Benefits include vastly reduced energy costs, reduced pressure on the national electricity supply and reduced carbon emissions. Buildings equipped with solar water heating are seen as attractive purchases, relieving new owners of the headaches involved in a retrofit. Solar is becoming a significant industry.

5.2 **Heat pumps**. Heat pumps offer major consumers of electricity a significant opportunity to reduce costs related to water heating. A heat pump can save up to 66% of energy consumption and, in some circumstances, even more than that. In effect, heat pumps transfer heat from a source such as air or water to the water which is to be heated. Heat pumps use the reverse cycle of a refrigeration utility to heat water. A heat pump can be up to three to four times more efficient than a hot water system which is powered by a normal resistance element. For every kWh of electricity supplied to the heat pump, more than three kWh of thermal energy in the form of hot water is produced.



An additional benefit which is often used to increase the economic benefits of a heat pump is that of the cooling cycle which can be utilised to simultaneously cool a portion of or an entire building. This is especially useful in the hospitality industry where cool air can be channelled into lobby areas, thus saving on the cost of a separate stand-alone air conditioning system. Heat pumps are typically mounted on the outside walls of buildings under the eaves or at ground level depending on the configuration of the system.

5.3 **Shower heads and water flow regulators**. Many large buildings include ablution facilities for workers where multiple showers consume large volumes of hot water on a daily basis. Together with solar water heating or heat pumps, one very effective way to reduce this drain on resources is to fit energy and water saving shower-heads or water flow regulators. Facility managers should use the services of an accredited plumber when retrofitting showers, because factors such as water pressure will influence what products are most suitable.

Energy Advisory Service

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Eskom's role is to aid its customers with basic information in the decision making process. Thereafter the Eskom Advisor will fulfil the role of energy advisor as part of the team that the customer selects.

Optimise your energy use

Eskom's Energy Advisors, in regions across South Africa, offer advice to business customers on how to optimise their energy use by:

- Understanding their energy needs
- Understanding their electrical systems and processes
- Investigating the latest technology and process developments
- Analysing how to reduce energy investment costs
- Optimising energy use patterns in order to grow their business

To find out more

If you would like to find out more about being energy efficient and growing your business you can email an Eskom advisor at **advisoryservice@eskom.co.za** or contact your nearest energy advisor on on 08600 37566 (ESKOM)

References:

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3. Eskom Annual Report - 2010

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