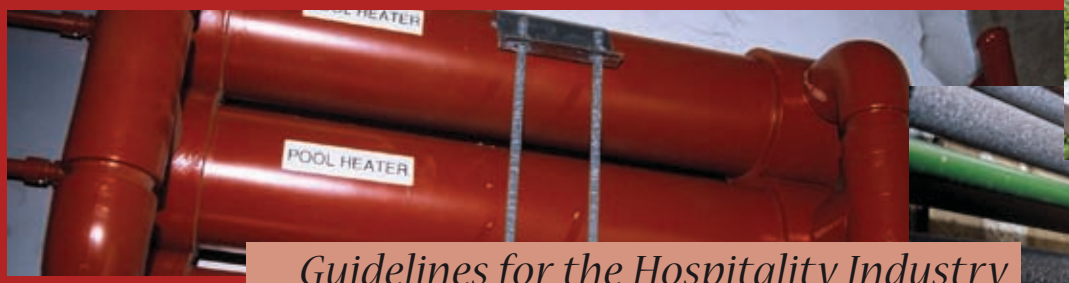
Energy use and Management



Guidelines for the Hospitality Industry

Geyser temperature optimisation

Geyser thermostat controls the element maintaining the temperature of the water in the geyser

- Traditionally thermostats are set at 65°C or even higher, in many instances it is possible to reduce the temperature to 60°C or even 55°C.
- Reducing the set point temperature on the hot water system has direct and instant effect on reducing the energy requirements of the boiler system.
- Make sure that geyser size is sufficient for warm water usage. As there will be more warm water used when the temperature is turned down. Installing a low flow showerhead will counterbalance this as well as save water.

Geyser temperatures control

Application: On every hot water geyser
Ease: 5/5
Availability: 5/5

Factors to consider:

Guest comfort, it is important to ensure that long pipe runs and/or ringmains are not loosing additional energy allowing the water temperature to drop below the required temperature.

Temperature should not be set below 55°C due to the possibility of microbial growth in the water.

Cost: R0.00
Payback: immediate

Requirements to meet criteria:

- Temperature must be set between 55°C and 60 °C

Example:

Hot Water Temperature	65 °C	55 °C
Incoming Temperature	15 °C	15 °C
Temperature difference	50 °C	40 °C
Required energy (100 litres of water @ 95% efficiency)	6.1 kWh	4.8 kWh
Energy savings		21%

Insulation of geyser with a geyser blanket

An extra layer of insulation can be added to the geyser helping prevent unwanted heat loss.

- Standing losses for a conventional 200 litre geyser must not exceed 3kWh in a 24hr period, this equates to almost 30% of the total energy stored in the water. (SABS 151)
- Losses can be reduced considerably by upgrading to a modern heavily insulated unit with a significantly lower standing loss figure.
- If the existing geyser/boiler is in good condition, it is cost prohibitive and impractical to replace it. In these instances an additional layer of insulation can be retrofitted to the tank.

Application: On all older geysers
Ease: 4/5
Availability: 5/5

Savings:
10% to 15% of hot water bill
(Depending on quality of geyser insulation)

Factors to consider:

It is also essential to heavily insulate the first 3 meters of hot and cold pipe work directly connected to the tank, if left un-insulated this acts as a heat sink constantly wicking energy out of the geyser.

3m pipe Insulation

Cost R50/meter installed (ideal for the handyman to reduce costs)

Payback: 1-2 years

Geyser blanket

Cost: R600 installed, R300 DIY (up to 200 litre geyser)

Payback: 1-2 years

Requirements to meet criteria:

- The first 3 meters of warm water piping coming from the geyser must be insulated
- The geyser must be covered by a layer of insulation of sufficient thickness to give a U Value of 0.5 W/m^{2}k or lower.

Walk in Fridges to have strip curtains in place

A multi strip curtain that covers the doorway of a walk-in fridge/freezer, usually made from clear PVC.

- Refrigeration can account for as much as 15% of a hotels total electricity consumption.
- Strip curtains help reduce the loss of cold which is replaced by warmer, more humid air, while the fridge door is open. This warm air needs to be cooled for the fridge/freezer to maintain its set point temperature. Reducing the amount of warm air that can enter the system will reduce the energy used to maintain the required temperature level and possibly reduce maintenance costs for plant and machinery.
- PVC strip curtains can reduce cold loss by approx 50 to 60%, insulated strip curtains can reduce losses by 80% depending on application and traffic.

Application:	On all frequently used walk in fridges/freezers
Ease:	5/5
Availability:	5/5

Factors to consider:

availability of insulated strip curtains in South Africa is unknown

Cost R400 to R800 for PVC curtains DIY
Payback: approximately 1 year, depending on traffic and door open time vs. door-closed time.

Cold store with PVC strip curtain

Cold store with insulated strip curtain

Requirements to meet criteria:

- Must have a strip curtain that covers entire opening on all walk in fridges and freezers.
- The light in the fridge freezer has to be connected to the door, so it doesn't stay on once the door is closed.
- In case the door is left open for too long an alarm must sound warning users about the open door, making sure it will be shut.

Insulation of all significant hot water pipes

An extra layer of insulation around the hot water pipes

- Full pipe insulation of hot water pipes reduces heat loss and can raise water temperature at the tap by 2 °C to 4 °C when comparded with un-insulated piping. This could allow for a lower water temperature setting.
- You also won't have to wait as long for hot water when you turn on a faucet or showerhead, which helps conserve water.

Application:	On all hot water piping
Ease:	3-5/5 depending on pipe access
Availability:	5/5

Factors to consider:

It is generally uneconomical to insulate very long pipe runs although where a ring main is used it is important that the entire network is insulated to prevent excessive losses.

Full Pipe Insulation

Cost: Usually a lower rate per meter due to the increased length estimate R25-R35 per meter.

Payback: Dependant on length of pipe run and further reduction of geyser temperature, typically 3-5 years.

Savings:
Typically 2% to 5% of hot water bill

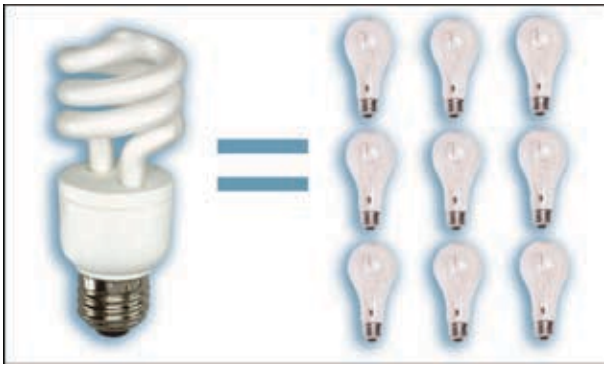
Requirements to meet criteria:

- All hot water pipe runs must be insulated
- The insulation must have a U Value of at least 1.0 W/m^2k

Energy efficient lighting

A fluorescent lamp or fluorescent tube is a gas-discharge lamp that uses electricity to excite mercury vapor in argon or neon gas, resulting in a plasma that produces short-wave ultraviolet light. This light then causes a phosphor to fluoresce, producing visible light.

- Replace incandescent globes with new energy-efficient compact fluorescents.
- A typical 100W incandescent globe produces 13 lumens per watt of electricity used, while compact fluorescents (CFLs) produce 45 – 60 lumens per watt, meaning CFLs require 50% to 80% less energy to produce the same amount of light.
- CFLs are so much more energy-efficient than incandescent globes because most of the energy consumed by incandescent globes is dissipated as heat (and not light). This reduced heat output means that thermal gains are reduced resulting in a reduced need for airconditioning.



"In South Africa, a single CFL globe can reduce CO2 emissions by 1 000 kg over its lifetime"

- A further benefit is that CFLs last up to 10 times longer than incandescent globes.
- CFLs get dimmer with age allowing them to be changed before failure.

Application: Everywhere, except where dimming is necessary.
Ease: 5/5
Availability: 5/5

Factors to consider:

Ensure that all existing fluorescent strip lights are operating with electronic ballasts this can save up to 25% over the old style magnetic ballast.

Virtually all fluorescents lights contain mercury so appropriate disposal is important.

Electronic ballasts usually consist of several electronic components, tend to be very small and light, while magnetic ballast are heavy and come usually in a longish format.

Cost: typically R15 to R25 per bulb

Payback: 6 to 12 months

Typical magnetic Ballasts

Electronic Ballast

Requirements to meet criteria:

- All incandescent globes must be replaced with energy efficient compact fluorescents, unless not possible due to a requirement for dimming or other factor.
- All fluorescent strip lighting must be fitted with an electronic ballast.

Maintenance programme in place for chillers and air-conditioners

Maintaining air-conditioning at peak performance

The performance of HVAC equipment often deteriorates over time. Therefore, thorough maintenance programs can bring substantial, cost-effective savings (a sample of nine office buildings in Sydney that implemented such maintenance programs, achieved median energy savings of 23%). The ongoing annual cost of the maintenance program was typically around 15 per cent of the ongoing annual energy savings.

A typical maintenance program should include:

- Clean evaporator/condenser, fins and filters and replace filters in air-conditioners regularly. A dirty filter will mean more energy is needed to pump air across the coils. If the coils or heat exchanger become dirty, their efficiency will decrease and the building will not be able to maintain its temperature settings.
- Check for air leaks. Ensure no air is leaking from air ducts. Recent studies indicate that 10-30% of the conditioned air in an average central air conditioning system escapes from the ducts. Test for air leaks in ducts by listening, visually inspecting damage, or by brushing soapy water across joints and watching for bubbles.
- Seal air leaks around doors and windows.
- Insulate air ducts and pipes to reduce excess heated or cooled air being lost.
- Check for a rise or drop in temperature in ducts and pipes by measuring the temperature at both the beginning and end of pipe runs. If there is a significant temperature change, upgrade insulation, especially if pipes are exposed to the outdoors or enclosed in a roof space that gets hot.
- Check thermostat calibration.
- Check 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. The staging of chillers and boilers is also important to ensure the correct equipment operates efficiently for the load of the day. Attention to inefficient chillers and boilers can reduce energy use by up to 30%.

Savings:
Can reduce running costs up to 15%

Application: On all air conditioning units

Ease: 4/5
Availability: 5/5

Cost: Between R300 and R600 per unit

Payback: less than 1 year depending on period of operation

Requirements to meet criteria:

- Chillers and HVACs must run at peak performance
- A professional tune-up must be conducted annually incorporating all of the points listed above.

Geysers on timers or load control system

- Saving can be realised by adding a timer unit to any geysers that are not in constant use. Limiting the amount of energy that they can consume.
- Timers should be set to ensure that enough hot water is available for peak use.
- Heat an appropriate amount of water depending on requirements e.g. when 3 guests are using the same geyser run it for longer than if only one guest is using it.
- It takes about 80 minutes to heat 100 litres of water to 55 °C with a standard geyser. So switching the geyser on 2 hours before showering should be sufficient.

Application: on all geysers that are not constantly in use
Ease: 5/5
Availability: 5/5

Savings:
Typically 5% to 10% of hot water bill

Factors to consider:

- This is more effective if you can't add a geyser blanket and pipe insulation.
- Makes most sense when combined with a solar water heater so that during the day one gives the solar water heater the time to heat the water and leaves the resistive heating units off.

Cost R500

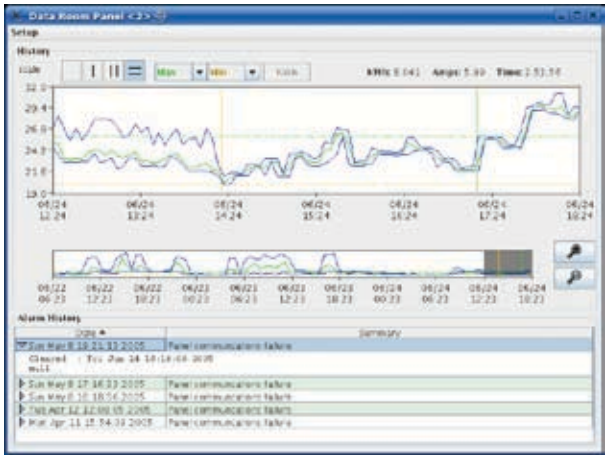
Payback: 200 litres hot water per day at 55 °C, 2-4 years.

Requirements to meet criteria:

- Have a working timer on all geysers.

Monthly electricity consumption monitoring

- Monitoring is the key to identifying energy saving opportunities.
- Installing sub meters can help with knowing how your energy is used. On top of that one can monitor energy saving procedures and see the result after making changes. The suggested locations for sub meters are:
    - Kitchen
    - HVAC
    - Rooms
    - Lights
    - Laundry
    - Outside lighting
    - Public areas
    - Hot water supply
- There are many types of different power meters on the market today. Anything from a simple meter which gets plugged in series with the monitored equipment to highly technical units wired into the switchboard and connected to a computer which records everything and analyzes the recorded data.



"Monitoring your electricity can help you identify and improve main users"

Application: in all hotels
Ease: 3-5/5 depending on complexity of the system
Availability: 5/5

Factors to consider:

Just recording the data is not going to save any money. One has to analyze it and try to eliminate or improve main users, so power consumption is reduced. Specalist help may be required.

Cost: anything from R300 to thousands of rand, depending on the complexity of the system

Payback: depends on saving potential identified through the power meters.

Efficient water heating – heat pumps

- Heat pumps provide an energy efficient alternative to resistive heaters, and are a much easier (logistically speaking) option than solar water heaters.
- A heat pump is a machine or device that moves heat from one location (the 'source') to another location (the 'sink' or 'heat sink'), using work. Most heat pump technology moves heat from a low temperature heat source to a higher temperature heat sink. Common examples are food refrigerators, freezers and air conditioners.
- Heat pumps can work anywhere in South Africa. Still, performance is mainly a function of wet bulb temperature, meaning it will work best in hot humid climates such as the coastal areas, where COP can reach 4.2 in summer.
- Use heat pumps instead of resistive hot water heaters. Heat pump water heaters are approximately 3 times more energy-efficient then 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.

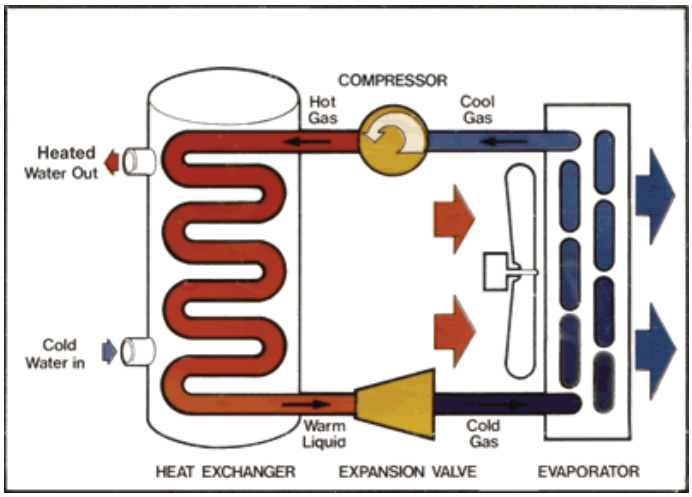
Application: Typically new installations but also good as a backup to solar water heaters.
Ease: 3/5
Availability: 4/5

Factors to consider:

A heat pump hot water system can be integrated with the HVAC system for further savings

Cost: R3,600 per kW (electrical input) @ 1000 litres of water at 60'C per kw per day.

Payback: Typical payback periods are in the 3 year range depending on the installation cost and occupancy. There are many variables involved, for instance if the heat pump needs to be installed far away from the plant room. Furthermore the occupancy has an influence on how much you can



Savings:
Depending on how the heat pumps are integrated into an existing or new system (Depends on if backup resistive heating is used or not), the heat pumps can save up to 66% of the energy used (compared to resistive heaters).

save, the more variation, the less the savings (On low occupancy days your savings will be lower as you use less water).

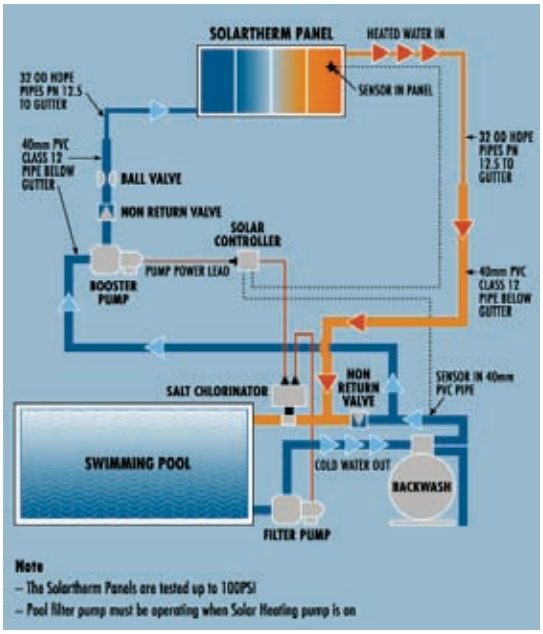
Requirements to meet criteria:

- All hot water to be provided using heat pumps (may also be used as a backup to a solar water heating system)
- COP (coefficient of performance) to be greater than 3.

Solar pool heating

Using the sun energy to heat pool water

- Use solar pool heating to decrease electricity consumption
- Solar pool heating can be used to completely replace existing electric pool heating systems
- Solar pool heating can be implemented either through general solar water heating, or pumping the water through black polypropylene pipes exposed to direct sunlight, which is the more affordable option. Since pool water doesn't need high temperatures. Although this will not be as efficient as general solar water heating especially in winter.
- If polypropylene is used one needs about 50% of the pool space for the heating pipes.



"The majority of heat loss from a pool occurs through evaporation"

Application: on all existing or new pools
Ease: 2-3/5
Availability 5/5

Factors to consider:

- A solar pool heater needs a lot of space, preferably roof space, which needs to be available (this space can be reduced by using collectors with a higher efficiency).
- It is possible to integrate pool heating with a solar water heating system for mains hot water.
- The aesthetics are a point one should think about, especially when using polypropylene pipes.
- Most heat loss from a pool occurs through evaporation, using a pool blanket overnight will reduce heat loss and reduce the amount of makeup water required.

Cost: depending on system and pool size, price can vary from R5 000 to R30 000

Payback: depending on the initial price paid and whether the pool was heated electrically before, payback period can vary from 5 to 10 years.

Efficient LED downlighters

Downlighters with light emitting diodes

- Replace incandescent downlighters with new energy-efficient light-emitting diodes.
- A typical incandescent downlighter produces roughly 20 lumens per watt of electricity used, while (white) light-emitting diodes (LEDs) can produce in the region of 90 lumens per watt.
- LEDs radiate considerably less heat than incandescent globes. This extends the LEDs energy saving capabilities beyond lighting as far as the heating, ventilation and air conditioning (HVAC) system. Considering that a incandescent globe has a efficiency of around 3% compared to an LED with around 15% – 30% it can make quite a difference on electricity consumption and thermal gains within a building. The table below shows how much electricity is wasted generating unwanted heat.

	Per year (24 h/day)
Incandescent	524 kW
LED	20 kW

- Although they are more expensive, LEDs can last up to 130 times longer than incandescent globes.

Application: Everywhere, except where dimming is necessary. Particularly good for signboards.
Ease: 5/5
Availability: 3/5

"LEDs low energy requirement makes them ideal for use with photovoltaic (PV) solar electricity"

Factors to consider:

- LED downlighters are generally not dimmable
- The next generation of LED downlighters should be able to compete with metal halide lights. Today's generation can only be used for certain applications, best tested through trial and error, as the light emitted by LEDs is very different than that coming from halogen bulbs.

Light source	Power	Lumens	lm/W	Cost per bulb
Incandescent	62,87 W	850	13,52	R3
CFL	13,94 W	800	57,39	R17 – R25
LED	3,74 W	60	16,04	R50 – R400

- Some companies claim that their LED downlighters are able to produce 240 lumens at 3W, which would mean that they produce 80 lm/W, this is after the beam has been focused using lenses and reflectors to produce a small spot of light. Therefore it is important to choose the LED according to its application.

Cost: costs range from R50 to well over R400 per bulb.

Payback: depends entirely on chosen LEDs and application.

Requirements to meet criteria:

- 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. Therefore some sort of application has to be replaced with LEDs lights.
- All incandescent lighting must be replaced with CFL or LED lights where applicable (justification for areas that are not converted will be required).

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 8kWh/m2 in one day.

- Use solar water heating to decrease electricity consumption.
- 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 your hot water requirements.
- Like the hospitality industry Solar Water Heating is seasonal and the maximum capacity occurs in summer and coincides with most establishments' highest occupancy.

Application:	Everywhere, particularly where electric systems can be completely replaced (for example: small guest houses). Larger facilities with central systems also have the potential for easy retrofitting.
Ease:	3/5
Availability	5/5
Requirements:	North facing roof (NE to NW is also fine) Flat or pitched Accurate hot water usage figures (occupancy levels can also be used although this is not recommended for larger systems) are required for accurate system sizing.

There are two main types of solar collectors flat plat and evacuated tube. The most common type found in South Africa is the Flat plate collector. This consists of a flat copper plate, painted black, that has water tubes attached to the absorber plate. As solar energy falls on the copper plate and is absorbed, the energy is transferred to water flowing in the tubes. The absorber plate is mounted in a casing that

Flat Plate

Evacuated Tube

has a clear covering and insulation to prevent heat loss. Flat plate collectors are capable of heating heater to between 60°C and 80°C.

Evacuated tube collectors produce higher temperature water and are more complex than flat plate collectors. Evacuated tube collectors consist of a series of tubes that contain a heat pipe to absorb solar energy and transfer it to a liquid medium. The tubes are evacuated (vacuum) so that there is very little heat loss from the tube to the environment making them more efficient than their flat plate cousins. Due to this higher efficiency vacuum tube collectors are capable of producing water at higher temperatures up to 120°C and are also suitable for industrial use.

Did you know?

To heat 100L of water from 18 to 60'C with an electric element takes 5.16 kWh (assuming 95% efficiency and no thermal losses e.g. pipes and geysers) releasing some 5 kg of CO2 (0.978 kgCO2/kWh) into the atmosphere

Costs: Installation costs range between R3000 and R8000 per 100L of hot water used per day. Cost range depends on the type of panel, whether new geysers are required, length of pipe runs and the complexity of the installation.

Payback: Depends on a number of factors but generally between 5 and 10 years.

Requirements to meet criteria:

- System is capable of producing at least 50% of hot water requirements
- Hot water meter has to be installed

Implementation of an energy management system

Installing an energy management system as part of a building management system.

- Building management system (BMS) is one of the important components in constructing a green building. It ensures that the building remains "green", through its life by automating and optimising many of the processes and functions.
- BMS is basically a solution, which is put into a facility to ensure an environment that is safe, secure, comfortable and most important, energy efficient. When properly integrated into a facility, BMS can result in the following benefits:
    - Optimized energy consumption
    - Provide alarm systems so as to take corrective actions
    - Monitor and control indoor conditions
- The BMS can typically controls the following applications:
    - HVAC and lighting control
    - Zoned HVAC settings
    - Variable speed drives
    - Emergency lighting
    - Safety & security solutions
    - Intrusion alarm systems
    - Security management
    - Water management and control
- A fully optimized BMS can save energy cost to the extent of 15% - 20% as compared to a building without BMS. Specific examples of BMS integration which result in energy saving are:
    - Night time purging to cool the building
    - Chiller management
    - AHU fan speed control based on heat loads
    - Speed control of chilled water pumps based on heat loads
    - Lighting controls
    - Temperature and humidity control

Application: On all buildings, although usually new buildings or refurbishment.
Ease: 1/5
Availability: 3/5

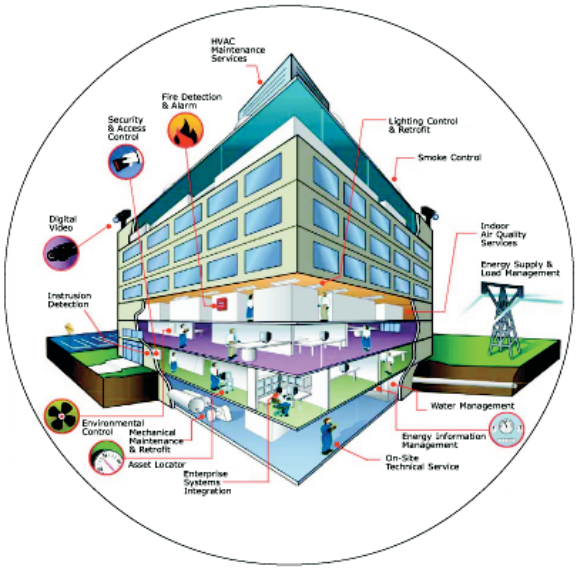
Factors to consider:

Cost: R100,000 – R1,000,000+

Payback: Normal payback period for investment on BMS varies from 4 – 8 years.

Requirements to meet criteria:

- A BMS must be installed during construction or refurbishment.
- The following applications must be controlled by the BMS:
    - Zoned HVAC system
    - Lighting control
    - All motors to be connected to a variable speed drive.



"a BMS minimizes energy consumption and maximizes indoor comfort, making it a valuable tool for any sustainable design."

Key card system for guest rooms

Reduce unnecessary consumption by switching off unoccupied rooms

- Key card energy saving devices can save energy in unoccupied rooms by shutting off power to electrical appliances and air conditioning.
- Mostly the systems are card operated, which only work with the door access card of the room.
- It has higher guest comfort by enabling them to switch off all lights and appliances with one switch before leaving the room. Through a delayed switch-off, guests can comfortably leave the room before the lights go off.

Application: for all electrical appliances, lights and HVAC within the room.
Ease: 1/5
Availability: 2/5

Factors to consider:

- One problem that has come to light in recent times is the need for charging hotel guests' electrical equipment such as laptop computers, digital cameras and mobile phones, all pose the question about what you should control in the room. You should consider leaving a socket live and clearly labelling 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.
- Guests should be notified of what power will remain on in the room, while they are out, to help prevent complaints when they return and find that their laptop or camera has not been charged.
- A system like this is not easily installed. The entire cabling of every room has to pass through a single point. This means all rooms have to be rewired. It is a good idea to do this every time a room or a part of the hotel is renovated and put in the system bit by bit.

"Key card electricity in rooms can save up to 25% of electricity consumption."

Cost: it is impossible to estimate the costs. It totally depends on the wiring in the rooms and how much has to be redone. The units themselves can be added to the door key card access system so only the actual card switches have to be bought.

Payback: just like with the costs it is not possible to say.

Requirements to meet criteria:

- The rooms have to run completely over the access system, which includes lights, HVAC, and appliances.
- One plug may be left active to let guests charge their appliances.
- Points will be given on percentage of rooms converted.

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, etc)

Opportunities for mechanical system retrofits to heating, ventilating, and air conditioning (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, by varying the supply airflow according to outdoor air conditions. This means the chillers need only operate from mid-morning to late afternoon, resulting in significant energy savings.

Application: All HVACs
Ease: 3/5
Availability 3/5

Keep thermostat within 10°C of the ambient temperature.

Keeping the thermostat within 10°C of the ambient temperature can save up to 33% of HVAC energy. So called smart thermostats do this automatically by overriding unnecessarily high or low settings.

Application: All HVACs. Smart thermostats should be considered on new installations.
Ease: 5/5
Availability 4/5

Reduce HVAC load by minimizing sources of heat.

Electrical devices produce differing degrees of unwanted heat that only serve to increase the HVAC load. Chief among these are incandescent lights. Eradicating incandescent lights as far as possible can drastically decrease the HVAC load (in addition to saving much electricity).

Other appliances like computers should be turned off when not in use.

Application: Everywhere.
Ease: 5/5

Energy Efficiency and Energy Recovery

Fresh air is essential to healthy people – and healthy buildings. That's why commercial buildings are required to bring in fresh air – typically 60-80 cubic meters per hour for every occupant. On average the air should change every five to 10 minutes. This unconditioned air greatly increases your building's air-conditioning load – and since an equal amount of air must be vented outdoors, you're basically "throwing away" air you've paid to cool.

A heat exchanger transfers heat from one medium to another. Common types of heat exchangers are: rotary, sealed, plate, coil run-around system, and hot oil recovery system.

Application:	Install heat recovery ventilators that exchange between 50 and 70 percent of the energy between the incoming fresh air and the outgoing return (conditioned) air.
Ease:	2-3/5
Availability	3/5

Other factors to consider:

Minimize exhaust and make-up air. Makeup air depends on the needs of ventilation for personnel, exhaust air from workspaces, porosity of the building envelope, machine air needs, and local health and safety requirements.

- Seal ducts that run through unconditioned space (up to 20 percent of conditioned air can be lost in supply duct run).
- Keep doors closed when air conditioning is running.
- Properly insulate walls and ceilings.
- Insulate air ducts, chilled water, hot water and steam pipes.
- Rewire fans to operate only when lights are switched on, as codes permit.
- Check for damper leakage/ensure tight seals.
- Shut off unneeded exhaust fans and reduce use where possible.
- Reduce air volume lost by reducing exhaust rates to the minimum.
- Review process temperatures.
- Install thermal windows to minimize cooling and heating loss.
- Zone controls
- CO2 sensors
- Variable speed drives

Appliances not left on standby

Awareness programme for staff and guests

- Most modern appliances actually use electricity when they are switched 'off'. This is more commonly known as standby power, where the appliance consumes energy when it is in standby or OFF mode. These "standby loads" occur in most electrical appliances, such as VCRs, televisions, stereos, computers, and kitchen appliances.
- The problem of standby power consumption is essentially a technological concern; more should be done by the appliance industry to help reduce the power consumption by equipment in standby mode. 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. Therefore it is important to make staff and guests aware to switch these appliances off when they are not in use and a significant amount of energy can be saved.

Application: On all appliances which have standby mode
Ease: 5/5
Availability: 5/5

"By training staff and making guests aware, a lot of energy can be saved"

Factors to consider:

The only way one can really save is by making sure that staff and guests are aware and switch appliances off when they are in standby mode.

When replacing or purchasing new appliances ensure that they comply or exceed with international standards. E.g. Energy Star

American research has shown standby losses to be between 6% and 26% of annual electricity consumption in the home.

Cost: R minimal
Payback: immediately

Requirements to meet criteria:

- Guests to be made aware by notices displayed in the rooms.
- Staff awareness and training programs in place.

Use of variable speed drives

- Of all the applications of variable speed control, centrifugal fans and pumps with variable torque load characteristics offer the greatest potential for energy savings.
- Typically installations are designed for worst-case load conditions that normally occur less than 5% of the time. Some form of process control is required for the other 95% of the time and there is no other method of control that can match the energy saving potential of a variable speed drive.
- HVAC and pump sets with a throttle or damper controller have constant power input regardless of changes in the load output over time. Variable speed drives are tailored to match the input power to the output load so no excess energy is wasted and maintenance is reduced due to the elimination of the throttle or damper.

Application: On all electric motors including Fans, pumps, lifts, HVAC and refrigeration units.
Ease: 3/5
Availability: 4/5

Factors to consider:

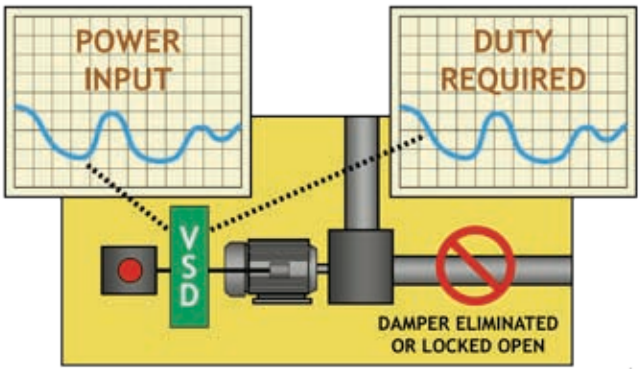
Installing a VSD only makes sense in places where the motor doesn't need to run at full capacity all the time. In this case the only saving will be on a power factor correction basis.

Cost: R1000/kW

Payback: between 8 months and 2 years depending on duty cycles and energy costs.

Requirements to meet criteria:

- Either 20% of all potential uses have to be converted to VSD's or one area must be completely converted, such as the kitchen.
- Potential uses for VSD's are: HVAC, pumps, extractor fans, in fact any electric motor which does not have to run at peak all the time.



Savings:
Highest savings can be achieved when: pumps are operated at low flow rates, existing system has bypass control, system has low static head, local electricity costs are high and pumps have steep curve design.