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LIGHTING
ENERGY EFFICIENCY GUIDE

Lighting accounts for around 10% of energy use in pubs and hotels. Yet by implementing lighting controls and efficient globes, lighting energy costs can sometimes be reduced by up to 50%.

This guide will help you to identify and implement simple solutions that will reduce your lighting energy use and save you money.

Effective and attractive lighting is essential for customer comfort and satisfaction as well as for the health and safety of staff and visitors. Judicious use of energy efficient lighting and controls can enhance all aspects of operation in providing:

- General lighting to communal areas such as receptions and corridors.
- Theme or mood lighting for pubs, bars, restaurants and in guest bedrooms.
- Security and safety lighting.
- External lighting for car parks and signage.

The key to energy efficient lighting is balancing the initial investment with operational and maintenance costs. An advantage of new lighting technologies and practices means that it’s now possible to simultaneously increase lighting levels and use less energy with careful consideration and planning. The main types of lamps being used are:

- Halogen lamps
- Incandescent lamps
- LED lamps
- Compact fluorescent lamps
- Fluorescent tubes

When talking about lighting efficiency, it is tempting to start by looking at the lights themselves but there are many ways to reduce the cost of lighting that do not involve lamp replacement. There are many opportunities for cost-effective retrofits to an existing lighting system.

INEFFICIENCIES COSTING YOU MONEY

Some common examples of lighting inefficiencies include:

- Dirty lamps that produce less light and more heat.
- "Over-lighting" by using too many lamps in some areas.
- Operating lights at full power when a lower lighting level would be sufficient.
- Leaving lights on unnecessarily, for example, external signage lighting during the day, security lighting during the day or when there are no people in the area, warehouse and cool room area lighting when there are no staff working there and lights on in staffrooms or rest rooms when they are vacant.

IMPROVING LIGHTING SYSTEM EFFICIENCY

You can cost-effectively improve the performance and reduce the costs associated with lighting by taking a systematic approach to managing your lighting system:

1. Know What You Need – Determine the function of lighting in each area; consider the required lighting levels both from a visual perspective and a minimum safe lighting level perspective – Figure 1 shows the minimum lighting levels required under Australian Standards.

Knowing what you need from your lighting is critical to achieving useful lighting energy efficiencies.

2. Know What You Have – Map your existing lighting including levels, types of lights and lamp wattage. Determine the extent to which your existing system achieves your needs. A lux meter is a cost-effective tool that is used to measure the lighting levels.

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<th>Minimum Illuminance (lux)</th>
<th>Task difficulty and examples</th>
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<td>400</td>
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Figure 1: Recommended minimum lighting levels up to 400 lux
Source: Taken from AS 1680.1: Recommended Maintenance Illuminances for Various Tasks, Activities or Interiors, Table 3.1

1 Energy Wise Hotels Toolkit (p9); Sustainability Victoria 2007. Hospitality: Saving energy without compromising service (p15); Carbon Trust 2012.
3. **Clean and Maintain** – Regularly clean and maintain your lighting system, which will reduce your energy consumption immediately. Make sure you recheck your lighting levels after cleaning as you may have more light than you thought which might open up further efficiency options.

4. **Lighten the Internal Environment** – Improve the lighting performance of your building by using light coloured paints and enhancing the use of natural light where possible.

5. **Reduce Lighting Use** – Reduce the use of lights where possible. Encourage staff to turn lights off when they are not needed, remove lamps where lighting levels are sufficient without them, and implement simple controls to automatically switch them off when no one is around or daylight makes artificial lighting unnecessary.

6. **Upgrade Inefficient Equipment** – Upgrade aging lamps and lights with cost-effective energy efficient versions. As these produce more light, you may find that you can now use less lamps overall.

**SAVE MONEY NOW: SIMPLE CHANGES WILL REDUCE LIGHTING COSTS**

There are some simple changes you can make in your business to reduce your lighting costs without spending a lot of money.

- **Switch it off** – Encourage staff to turn off lights that are not needed including when they are leaving a space unoccupied. Putting up clear signage indicating which switches control the light in which areas will increase the ability of staff to manage lighting and remind them to do so.

- **Maintenance** – Cleaning and servicing lamps, reflectors and diffusers regularly ensures optimal transfer of light. Most lamps generate less light as they age but continue to use the same amount of energy. As such, lighting levels should be monitored and older lamps changed out when they start to degrade. Change out lamps that have failed so that lighting levels are maintained (this especially applies to fluorescent lamps as the fittings still use electricity even when they aren’t working).

It is also important to clean sensors and check that timers are set correctly.

**GREATER LONG TERM SAVINGS: LIGHTING INVESTMENTS THAT MAKE SENSE**

There are a number of smart business investments that can be made to improve the performance and reduce the cost of your lighting systems:

- **Automatic Controls** – Utilise automatic controls to turn lights on and off when required. Occupancy detectors, daylight sensors and timer switches are inexpensive, easy to install and can significantly reduce the cost of lighting in areas of your building. Sensors can achieve savings of 30% to 50% on lighting costs and are especially useful in:
  - Storerooms, offices and back of house areas
  - Toilets
  - Cellars
  - Function rooms and banqueting suites
  - Areas where lighting is zoned

The application of occupancy systems in hotel guest rooms is commonplace in larger hotel chains and worth considering as the savings can be substantial for both lighting and heating, ventilation and cooling. These systems can also be used to reset the room temperature set-points to reduce excessive heating or cooling.
**Lighting Energy Efficiency Guide**

- **Daylighting** - Daylighting means opening blinds and installing skylights or additional windows. Implementing daylighting strategies reduces the need for artificial lighting. Use window glazing or reflective films to control glare and radiant heat transfer through windows.

- **Low Energy Lighting** - Consider replacing lamps with more efficient equivalents as this simple action will result in significant savings e.g., light emitting diodes (LED) offer significant improvements in energy efficiency when compared to halogen globes and also last significantly longer. In addition to reducing the lighting energy use, low energy lighting also produces less heat, which reduces the load on the HVAC system, which saves more money.

When considering the replacement of lamps it is worthwhile trialing the new lamps in a select part of the building to ensure that its performance (startup, lighting output, heat and aesthetics) makes it an appropriate solution for your application. Always consult a lighting technician before upgrading lighting systems.

**CASE STUDY - Rendezvous Grand Hotel Adelaide**

After recently undertaking an audit of the building and surrounds to determine how energy is used, identify key inefficiencies in energy use and quantify the potential for further energy savings, it was found that the greatest energy savings opportunities at the hotel could be achieved through lighting upgrades, specifically the conversion of 20W halogen down lights to 4W LED lights in the guest rooms and the common areas.

Whilst it was determined that the replacement would have a significant capital cost and long payback, the costs would be offset by the reduction in maintenance and replacement costs as the LED lights have approximately 50 times the life of a standard halogen globe.

The key opportunities of the lighting upgrade were:
- **Capital cost**: $120,100
- **Savings**: 169,500 kWh/year
- **Simple payback**: 7.8 years

These changes in addition to some HVAC improvements are expected to reduce energy use by 10%.


**Low Energy Lighting Upgrades & Technologies**

When you have reduced the use of your existing lights to its most efficient functional level, consider replacing the lamps in your light fittings with more efficient equivalents or upgrading the fittings entirely. Some upgrade pathways to new, low energy lighting technologies include:

- Replace incandescent globes with compact fluorescent lamps (CFLs). Compact fluorescent bulbs last up to 8 times longer than incandescent bulbs and use 20% of the energy. Dimmable CFLs are now available and can save up to 40% of energy consumption of a non-dimming CFL.

- Replace incandescent halogen bulbs with equivalent LED bulbs to reduce energy use by 73%.

- Engage an electrician to replace T8 fluorescent tubes with T5 fluorescent tubes using a T8-T5 adapter to reduce energy use by 33%.

- Engage an electrician to replace twin fluorescent tube fixtures with a single fluorescent tube fixture incorporating a reflector to reduce energy use by 65%. Consideration should be given to require lighting levels, as this doesn’t provide the same light output – an excellent solution if you have excess lighting levels.

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3 The National Institute of Building Sciences in the U.S. has a guide to the implementation of ‘daylighting’ strategies here.
• Replace incandescent or fluorescent exit signs with long lasting LED exit signs.
• Install dimmers on lighting fixtures with an electronic ballast so that the light intensity can be adjusted.
• Engage an electrician to replace fluorescent tubes in refrigerated cases, cabinets and glass door freezers with LED tubes as they use less energy and produce less heat that reduces the load on the cabinet refrigeration system.

There are also smaller changes you can make which should be carefully considered in terms of financial payback before proceeding:
• Replace T8 halophosphate tubes (magnetic ballast) with T8 triphosphor tubes (electronic ballast) as it has 20% greater light output so less lighting fixtures are necessary to achieve the same light levels.
• Replace magnetic ballasts with electronic ballasts. The ballast controls the starting and operating voltages so that the right amount of light is emitted. An electronic ballast reduces energy use by 10-20% per unit, extends the life of the tube and reduces flickering.
• Install autotransformers on fluorescent lights. They improve efficiency of existing fixtures by 3-4% by reducing the start-up voltage of a lamp to a lower level without a significant difference in lighting levels.

EVERYONE HAS A ROLE TO PLAY
The efficiency of your lighting system is as much to do with behaviour of the users, as it is the technology that is installed. All members of staff have important roles to play in reducing lighting energy cost.

Management
The establishment of clear, concise policies regarding the use of lights by staff and the management of lighting by maintenance staff/contractors is critical to the efficient management of your lighting system.

Staff
Adhering to energy efficiency policies and procedures that govern the operation of lighting is important. However there are simple things you can do to help including switching lights off that aren’t required (sufficient daylight or you are leaving an area) and reporting lights that have failed.

Contractors
Maintenance contractors have a key role to play in lighting efficiency as poorly maintained lights use more energy and produce less light. Keep all lights and lamps clean and in good working order. You can also be good source of useful information about which lighting systems can be cost-effectively upgraded.

MORE INFORMATION

ABOUT THE PROGRAM
In response to rising energy costs the AHA has developed a range of targeted resources to assist small and medium businesses to improve energy efficiency and reduce energy costs.

These resources were developed with support in the form of an Energy Efficiency Information Grant from the Australian Government.

This program has been designed to assist small to medium businesses to understand where and how energy is used, carbon emissions that result from the use of energy, and to understand and communicate the opportunities for reduction and resource efficiencies.

The resources, tools and information available under the program identify energy efficiency improvements that can be incorporated into day-to-day operations and factored into future capital expenditure budget.

For more information please visit www.aha.org.au/energy