

These application notes are for general guidance and information only. Users will need to undertake independent analysis for specific sites if any of these measures are to be implemented. Consideration should be given to engaging the services of a suitable consultant to assist with this task.

Summary

Lighting uses a large portion of electricity in hospitals (approximately 30%). By controlling the lighting system so that the appropriate amount of light is provided only when needed, considerable savings can be made.

Hospitals can reduce electricity bills by controlling their lighting system in the following ways:

- Switching (automatic switching or manual).
- Dimming (this may require an upgrade of the light fittings as well).
- Sensors (these can be used to turn off lights in rooms when they are unoccupied, or to dim or switch lighting in wards and corridors when there is adequate daylight available).

Background

There are different functional areas within hospitals, all of which operate in different modes throughout the day and night. Lighting control can be automated to accommodate these different modes, saving energy whilst maintaining a suitable environment for patients and staff.

In areas where hospital staff perform specialised tasks, such as surgical procedures, it is common for local task lighting to be provided. This provides staff with maximum control throughout the procedure, and means that the general lighting in the area need not be so high. Likewise in wards, patients should be provided with local (or task) lighting, so that they can read, without requiring the entire ward having to be lit.

The following are some lighting control options:

- Manual switching (A staff awareness campaign to get staff into the habit of switching lighting when exiting a room. Labels in patient areas such as bathrooms so that patients do the same).
- Automatic switching or dimming (This can be done using timers or sensors for exterior lighting, and sensors for store rooms and meeting rooms so that once people have vacated an area the lighting automatically switches off).
- Automatic daylight controls which dim or turn off electric lighting when it is sensed that natural light is adequate.

Opportunities and Constraints

It is much more cost effective to install lighting control during original construction. However it is possible to achieve good returns when retrofitting into an existing hospital. There would be disruptions to patients and staff however, as retrofitting would require installation of devices in rooms.

A campaign of staff awareness to switch off lights when not in use has little or no capital cost, would require no disruption and would return immediate savings. However this is not a reliable means of control unless there is wide ranging "buy in" and a sustaining change in work practices.

The following factors should be considered when choosing a lighting control solution:

- Energy savings are increased if the circuiting allows light fittings near windows to be switched separately, so they may be turned off when there is adequate daylight.
- Automatic switching and dimming is generally more reliable than manual switching. Automation can be integrated with timers, daylight sensors or occupancy sensors depending on the needs and use of a room.
- Fluorescent light fittings with special electronic ballasts can be dimmed, using less energy, and creating a more flexible and dynamic environment.
- Staff should be consulted on the sort of lighting control system that best suits their needs. While lighting control can improve the work environment, an inappropriate system could become a nuisance to staff.

It may be appropriate to consider implementing lighting efficiency energy saving measures (refer Lighting Efficiency Application Note) whilst undertaking an investigation in lighting control.

Impact of Implementation

Staff would notice the benefits of a lighting control system, as it would provide a more dynamic work environment, and if automated, it would alleviate staff from the duties of manually controlling the lighting. Control of lighting that reduces artificial lighting when there is sufficient daylight provides a link with 'the outside world', which has benefits for patients and staff.

Capital costs depends on which lighting control system is being implemented:

- staff awareness programs have little or no cost
- simple sensors start at \$200 (for one occupancy sensor in a room)
- advanced building lighting control systems are in the range of \$10 000's to \$100 000's depending on the size and scope.
- cost analysis should include labour, which would be greater for changes to existing buildings compared with new.

The running costs of the hospital benefit from the provision of lighting control systems as follows:

- functions are automated
- life of lamps would be increased due to decreased running hours
- advanced control systems can identify when/where fittings need to be replaced.

Analysis

The following example outlines possible savings arising from the installation of daylight sensors and automatic switching in wards.

If half of the lighting in wards could be switched off during 9 hours of daylight everyday, a hospital that spends \$365 000 a year on electricity, and whose floor area consists of 30% wards could expect a saving of \$9855 per annum. Daylight sensors could be installed for around \$35 400, giving a payback period of 3-4 years.

The actual savings achieved would vary somewhat depending on seasonal (and hence daylight) conditions, and the layout of the building. This example outlines only one possible method of lighting control, however there is a range of other possible methods that would be suitable in other areas.

Conclusions

Lighting control systems should be installed in all new hospitals. These controls could range from simple sensors and automatic switching and dimming to sophisticated systems which integrate with other building management systems. The level of control to be installed depends on the size of the hospital, and other levels of building automation to be provided. Existing hospitals could easily retrofit some lighting control systems, and still achieve a good return on investment.

All hospitals should encourage staff to switch off lights in areas that are not in use. Benefits from lighting control systems are not only energy savings, but also increased flexibility, simplicity and a dynamic environment for patients and staff.

References and Sources for Further Information

- The SEAV have published information sheets on their website www.seav.vic.gov.au
- SEAV 'Model Technical Specifications'
- Australian Standards AS1680 series on interior lighting including 1680.2.5 'Hospital and medical tasks'. This standard describes the types of control systems that should be incorporated in hospital lighting.