

How to Implement Lighting Controls

Lighting uses some 20% of the electricity generated in the United Kingdom; non-domestic lighting is responsible for around 24 million tonnes CO₂/year.

Lights left on in empty buildings are a sure sign of waste and unnecessary carbon emissions



Image courtesy of Zumtobel

Introduction

The quality of artificial lighting is one of the most important influences on performance in the work place.

However lighting is also the most obvious use of electricity. Any lighting left on when it is not needed is both costly and wasteful.

Installing the right lighting controls for your premises can ensure that artificial lighting is provided only at the right time, in the right place and in the right quantity.

What are lighting controls?

Lighting controls vary from simple on/off switches to building wide, networked, control systems. They are equally appropriate to all sizes and types of buildings; it is just a question of choosing the most suitable solution.

Better control of lighting can reduce costs by 30-50%, and significantly reduce carbon emissions at the same time, so long as the right decisions are made when selecting the lighting controls.

What are the benefits?

Lighting controls offer further benefits than simply saving energy. Depending on the application they can improve comfort, reduce maintenance costs and impart greater flexibility to the use of a workspace.

They need not be complicated or hard to understand; in fact they should always be easy to use and manage.

Of course the extent of any lighting control project will have a major impact on its viability and cost. Sometimes it may be enough to make small changes to the existing switch wiring. However, simply automating the control of the lighting is not, in itself, an assurance that lighting electricity use will be reduced. It is the correct combination of user operation and automatic functions that will deliver real energy savings.

Lighting controls can pay for themselves in at least two ways.

1. The obvious payback involves the cost of the electricity being saved by the controls – either through turning lights off or dimming them.
2. When a wider lighting refurbishment is being considered the choice of lighting controls might reduce the overall project cost. For example, modern lighting controls offer the designer and installer opportunities to reduce on site labour costs dramatically. The savings relate to the fact that local 230V switches are expensive in terms of labour whereas sensors and ELV wiring can be much cheaper. See [How to implement lighting refurbishments \(CTL163\)](#) for further information.

What lighting controls are available?

[Approved Document L in the Building Regulations](#) requires lighting to be controlled or very locally switched. If switches are to be used the Regulations actually determine the maximum number of lights that may be controlled by one switch and its distance from those lights.

If a person cannot see the area controlled by a light switch how can the right decision be made?

Staff like to have some control over their lighting, and so fully automatic controls often end up being overridden or disconnected

Lighting controls are best deployed as a reliable means of turning off the lighting. People will turn lights on when they need them; sometimes they forget to turn them off. So the most effective control strategy is:

- Request on.
- Auto off.

Movement sensors

Various called occupancy or presence detectors, these devices rely on movement to inform the lighting controls. Three different ways to detect occupancy are generally available, and the choice is often determined by the application.

1. Passive infra-red (PIR).
2. Ultrasonic.
3. Microwave.

Generally speaking PIR sensors are more economical than the other two and more suited to close range, small area, applications. See [LIA Lighting Control Guide](#).

Daylight sensors

Often referred to as 'photocells', these are designed to measure natural light levels and use this information to determine whether artificial lighting should be on, off or dimmed.

Daylight sensors are often included with movement sensors as a combined unit to reduce costs and installation times.

Dimming v. Switching

If a lighting control system is able to dim as well as switch then increased electricity savings can be realised. Dimming gives occupants more choice over the levels of lighting they experience. It is also less intrusive to adjust lighting levels than to suddenly turn them off. If the lighting controls can be implemented alongside fully dimmable lighting then the staff will be happier, the savings will be greater and the lighting design will be maintained.

Integration in luminaires

Some manufacturers include controls in their luminaires.

What are the options? – Ensuring the best solution for your needs

Improving the existing switching arrangements may be a quick and practical fix. It will tend to depend on the existing fabric and electrical wiring arrangements. If current remote, bulk switches can be replaced by more local controls there should be an immediate reduction in lighting use.

Stand-alone controls

In smaller premises or more traditional buildings where wiring changes may be expensive it is often best to consider 'stand-alone' controls. These are units that combine a sensor (either daylight or movement or both) with a controller that will operate the local lights. These are often more easily installed than adding local switches. In most cases they are on/off devices able to control the existing lighting.



Image courtesy of Zumtobel

Lighting control systems

Most lighting control systems rely on some form of additional control wiring. This can be a barrier to their deployment into existing installations. However, systems are available that use mains borne signalling or wireless technology that might make this option practical.

Look behind your ceiling; you might already have a lighting control system!

In some cases you may find that you already have a lighting control system without knowing about it! Many commercial buildings constructed over the last twenty years were equipped with lighting controls system infrastructures. Investigating the lighting wiring within a false ceiling may well reveal that a control system is there; it has just never been properly fitted out. Or the evidence may be revealed on 'as fitted drawings' of the building(s).

Table 1: Some suggested applications

Type of space	Examples	Controls
Owned	Cell office, small workshop, consulting room.	Wall switch, remote, movement sensor -possibly in combination.
Shared	Open plan office, production area, ward.	Manual switching, movement sensors, light sensors – localised and combined.
Temporarily owned	Meeting room, 'hot' office, classroom.	Scene control plate or logical manual switching with automatic off.
Occasionally visited	Store room, book-stack, toilet.	Movement sensors, possibly combined with local manual switching.
Un-owned	Corridor (open or closed), stairs.	Automatic or remote manual operation, movement sensors in some applications.
Managed	Hotel lounge, museum, foyer, terminal.	Remote manual and/or automatic control.

How to get lighting controls installed and working effectively

Initial assessment

There are two important reasons why a lighting survey should be carried out before proceeding with a lighting control project.

1. To identify how much electricity is being used by the lighting, and where and why the waste is occurring.
2. To have a good understanding of the building and its wiring so that the supplier is aware of any constraining factors. (e.g. Solid ceilings may limit the choice of controls.)

To help inform your decision why not carry additional research into lighting controls? This increased knowledge will help with your choice of supplier. A good starting point is the [LIA Lighting Controls guide](#).

The cost of installing lighting controls is highly dependent on the existing wiring. Discuss the possibilities with either your electrical contractor or a supplier, or even both.

When considering a lighting control project, follow this simple check list:

1. Assess.
2. Involve.
3. Specify.
4. Install.
5. Commission.

Setting-up and commissioning any lighting control installation is a vital part of the process. A small investment in the CIBSE Commissioning Code L will help you to deliver a well-received, effective project.

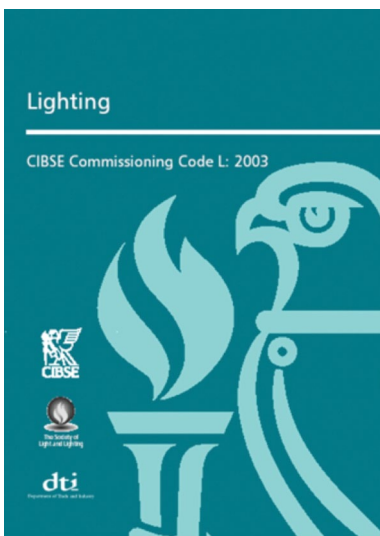


Image courtesy of Commissioning Code L available from www.cibse.org

Common problems & finding suppliers

Common problems

The installation costs are too high.

1. Seek further advice from suppliers, and consider alternative solutions. Or:
2. Is a wider refurbishment due? And can this be the opportunity to act?

The maintenance team do not like the added complication of controls.

Ensure the supplier offers good training and involve the maintenance provider in your decisions.

The staff do not like the controls.

Involve them before you implement the scheme and keep them informed throughout the process.

Can I get financial help?

Yes.

Lighting controls are included within the Enhanced Capital Allowance (ECA) scheme. The ECA is a key part of the Government's programme to manage climate change, and is designed to encourage businesses to invest in energy-saving equipment. The Carbon Trust manages the [Energy Technology List](#), where you'll find details of lighting controls permitted under the ECA scheme.

Questions to ask

Does the supplier understand lighting?

A poorly applied control system can spoil a good lighting design.

Are the light sources fully compatible with the proposed controls?

Most HID lights are not suited to movement detection due to slow re-strike times. If a light is not dimmable there is no point in supplying dimming controls.

Is the lighting old and no longer energy effective?

Adding a control system to manage an obsolete lighting system is a waste of time and money.

Renew the lighting and add appropriate controls.

At our last office the staff did not like the lighting controls; how can we make sure they will be accepted here?

Explain clearly what is being proposed – the supplier may well help – and involve the staff in the decision.

Does the supplier offer training in the correct operation of their controls?

If no-one understands the lighting control system it will not be effective.

Finding a supplier

Lighting designers

There are directories of practices available through the [Society of Light & Lighting](#) and the [Institution of Lighting Professionals](#).

Manufacturers

Both the [Lighting Industry Federation](#) and the [Energy Services and Technology Association](#) have dedicated lighting controls groups. Lists of member organisations are available.

Electrical contractors

[The Electrical Contractors Association](#) can put you in touch with electrical contractors who operate nationally or local to your area.

Carbon Trust Implementation Solutions

[The Carbon Trust Implementation Solutions](#) puts you in contact with accredited suppliers across all sections of lighting.