

How to Implement External Lighting

Lighting can enhance our experience of places at night and provide safety.



Image courtesy of Zumtobel

The use of artificial lighting at night can make people feel safe walking along a street, but it can also create exciting places and enhance architecture. However it is used, the lighting must be appropriate to its location and environment.

Ensuring exterior lighting is effective and efficient will save energy and reduce carbon emissions – but it will also lead to reduced light pollution, which is becoming an increasing concern.

Controlling the light is crucial to the elimination of light pollution so appropriate luminaires should always be selected.

Light pollution can be categorised into three distinct areas: light which is directed into the sky, referred to as 'sky glow'; light which goes beyond the area it was intended to (light spill) and light which impacts onto other properties (light trespass). The most efficient exterior lighting will eliminate all of these, meaning that all of the light is delivered to where it is required.

What technology is available?

For most applications, luminaires come in two distinct types: lanterns and floodlights. For architectural lighting, luminaires come in various styles and sizes.



Images courtesy of Philips

LED technology is ideally suited to exterior lighting and can be used in a variety of applications. Its small size enables smaller luminaires to be used, which are ideal for architectural enhancement of buildings.

Exterior luminaires are usually sealed units in order to protect them from water damage, so retrofitting more efficient lamps is not usually a viable option.

However, the latest technologies and improved luminaire design do offer the opportunity to save energy through luminaire replacement programmes.



Image courtesy of NASA

What lighting is appropriate for my application?

The main applications for exterior lighting are:

- Street Lighting.
- Car Parks.
- Security.
- Architectural.
- Civic
- Sports

It is important to get professional advice (see Find a supplier section) regarding appropriate lighting levels as this will influence the suitability of luminaires and where applicable, the height of columns.

For road lighting and car parks, lanterns with either a completely flat glass or a shallow bowl are preferable to deep bowl luminaires which cast light upwards as well as towards the road.

Well controlled light



Image courtesy of Thorn Lighting

LEDs are increasingly used for street lighting and car park lighting as they reach full output instantly, which enables them to be switched on and off easily. This is in contrast to High Pressure Sodium and Metal Halide lamps which take a little time to reach full light output, and can take a long time to switch back on after they have been switched off, so are not suited to presence detector controls.

It is important to only light at the right time and whilst it may be argued that some lighting, for safety or security for example, is on all night, the majority of applications should be more controlled.

Car park and security lighting can be controlled effectively with presence detectors which could be combined with time clocks.

With architectural lighting, the range of luminaire choices is much wider and the use of LEDs means much smaller luminaires can be used than has historically been the case. Again, the environmental considerations must be taken into account and the lit effects should be contained as much as possible to the actual building with wasteful upward light minimised. Care should also be taken to avoid light trespass into windows.

Buckingham Palace – lit with LEDs using less than 3kW of energy



Image courtesy of JWSA

Lighting can enhance public spaces helping to create a sense of community, and lengthening their use into the evening hours, however it is important that all architectural and civic lighting is timer-controlled, so lighting is not left on all night with no-one to benefit from it.

In civic and residential areas, renewal of luminaires, can not only reduce energy consumption, but also create a more pleasant environment for people.

Some lamps, such as metal halide and LED are referred to as 'white' light sources. Under white light, there is scope to have lower light levels and the perception of safety is increased; this is especially important in civic and residential applications.

However, where this is less important, for example in storage yards or for large area lighting, high efficiency sources such as High Pressure Sodium lamps may offer a more cost effective solution.

These lamps can also be used in some recreational sports lighting applications although for playing standards above club competition, metal halide lamps are more suitable, with their improved colour rendering. With sports lighting applications, maximum control and minimum light

pollution can be achieved with asymmetric floodlights to ensure the lighting is aimed at the pitch.

Sports lighting is usually subject to curfew so lighting must be controlled with a time clock.

You can read more about different light sources in the [Lighting Technology Overview \(CTV049\)](#) and the [How to implement LED lighting guide\(CTL164\)](#).

How to get started

Before commencing any exterior lighting installation, it is important to consider whether the lighting is really necessary and what purpose it will serve.

Clearly there are sound reasons for exterior lighting such as safety, security, facilitating work outside of daylight hours and extending the time leisure facilities can be used but it is always good practice to first question whether the lighting is needed.

If it is ascertained that the lighting is necessary or justified, then the next considerations are how much light is needed and for how long so appropriate luminaires and controls can be chosen. For all new external lighting applications, advice should be sought from an expert.

There are guidelines on appropriate lighting levels for applications given in the [SLL Code for Lighting](#). In some instances, particularly for street lighting and pedestrian routes, the recommended light level changes according to the built environment; less light is needed in rural or semi-rural environments in comparison to a city centre.

The recommended limits for light pollution also vary. More information can be found in [SLL Factfile 7](#).

Local Authority planning permission may be required for some exterior lighting installations and it is always best to check with the local council to see if this will be required. This is particularly the case for sports lighting and any lighting installation which infringes upon council owned property including highways, such as car parks close to the road.

If the area you are considering installing lighting is in a rural area or close to waterways, you may need to conduct a full environmental survey; to ensure that lighting doesn't interfere with or compromise the environments of protected animal species in any way. Contact your local authority for guidance.

For some older buildings, permission may also need to be sought from English Heritage which may include listed building consent. This applies not only to the lighting of older or historic buildings but any lighting around them such as car parks or pathways.

Issues to consider

Does the lighting need to be suitable for CCTV?

'White' light sources such as fluorescent, metal halide and LED are better for CCTV than High Pressure Sodium.

The lighting needs to come on instantly when someone approaches the building for security.

Avoid sources such as metal halide and high pressure sodium as these take quite a long time to reach full light output.

Is Local Authority or English Heritage planning consent required?

For listed buildings, an expert lighting designer may be worthwhile who can help talk through plans with English Heritage and reach a solution with them.

If you are upgrading your lighting, make sure you consider the controls as well (cross refer to [How to implement lighting controls \(CTL161\)](#)). You may want to control the lights based on time control, photocell control or presence detection.

Questions to ask potential supplier

Ask your supplier whether the lighting meets the environmental requirements for light pollution?

Will the lighting scheme provide the right amount/direction of light for the activity, without over-illumination?

Have potential hazards been identified and properly lit?

If planning decorative lighting, is it appropriate for the age and architecture of the building?

What lighting controls been specified? Will the supplier commission the controls, and train you how to use them.

Finding a supplier

Lighting designers

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

Manufacturers

[The Lighting Industry Federation](#) has a comprehensive list of member organisations who supply lighting equipment.

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.

Case study

Central Bedfordshire Council

The Council have piloted a trial of LED luminaires to replace traditional street lighting.

Traditional street lights are being replaced with LEDs to achieve significant wattage reduction, as well as reducing the maintenance burden of the highways team; 381 LED lanterns were installed across two pilot areas – one urban and the other semi-urban, using less than 50% of the installed energy load.

The instant light given by LEDs mean that full light output is achieved with no voltage spike or warm up period and using LEDs enables the standards to be met at a slightly lower light level than traditional sources would require.

As LEDs provide a more focused beam of light, they result in reduced trespass of light behind the column or into the sky although some residents felt preferred light onto the front of their homes for security reasons.

The Council now hopes to begin replacing life-expired lanterns with modern LED alternatives.

	Traditional	LED
Number of columns	373	381
Annual electricity consumption	119MWh	54MWh
Annual electricity spend	£10,710	£4,860
Annual CO ₂ emissions	64 tonnes	29 tonnes