



Holy Sepulchre, Peterborough

## Introduction

Lighting a church building requires both artistry and technical ability, and requires the input of specialist advice, ideally from a suitably experienced independent consultant in order to achieve a successful scheme. Modern lights, with effective and suitable controls, using only what light is needed, will significantly cut your energy use. This guidance note is intended to give a broad overview of the technology, an idea of what a lighting scheme could seek to achieve, and some basic principles to consider regarding the impact on your church building.

## What is a good lighting scheme?

Lighting within a church can have a positive or negative impact on people's experience of the building. At the same time, the energy used to run the lighting scheme will add to the church's carbon footprint, so the system and its components should be energy-efficient. An effective scheme will enable users, amongst other things, to:

- see and move around freely
- read services sheets / projected words and images
- see others – celebrant, choir and congregation
- enhance and appreciate the building's spatial qualities, architectural details and points of interest (wall paintings, artwork, woodwork, textiles, monuments, sculptural details, architecture)
- enhance liturgy
- easily avoid hazards around the building (steps, slopes etc)
- contribute to special events, such as concerts.

Lighting can also provide dramatic effects, create an atmosphere and enhance the building's architectural characteristics. The controls should be simple to use, and ensure that light is only used where and when needed. A well-designed lighting scheme will take all of the above points into consideration.

## Design brief

When considering a lighting project, it is vital for the PCC or Chapter to first be clear of its reasons for change, its needs and what it hopes to achieve. This will enable them to engage meaningfully with their architect/surveyor and any specialist consultants. It is helpful to bring in a specialist lighting consultant at the earliest possible stages of the consultation. An independent consultant will usually provide advice based on a wider range of products to the PCC than a lighting company, and will go through a tender process with the PCC to appoint the appropriate contractor.

The PCC should prepare a thorough brief for the consultant that takes account of the following:

- Understanding how natural light affects the interior of the building throughout the day and year.
- Looking at how the building is used, including regular and special services as well as midweek activities, and what the routes are moving through the building.
- Identifying areas that may be difficult to navigate, such as steps, towers, or crypts, and areas with specific functions such as vestries or kitchens.
- Using the opportunity to increase energy efficiency as an effective step towards Net Zero Carbon.
- Considering whether you wish to control lighting effects: this could be the capacity for dimming, if necessary; the use of 'zoned' areas; or having 'pre-sets' for regular events.
- Thinking about whether you wish to highlight special features (architecture, fixtures or fittings). Note that specialist advice will be required on the lighting of sensitive objects such as wall paintings.
- Considering the type and location of cabling runs, as they should not only be disguised, which can be done using the correct type of cable and containment, but also must not cause any damage to the fabric.
- Ensuring that lighting is not positioned so that it produces a disturbing or distracting glare.
- Thinking about how the repair and maintenance of light fittings will be managed.
- Considering re-using existing light fittings that have a historic connection to the church. If they have heritage value in themselves, it is possible to upgrade old fittings and make them compliant with modern standards.
- Choosing new fittings of a scale and character suitable to the building.



Enstone, St Kenelm (Photography © Light Perceptions Limited)

Further guidance is available from Historic England's lighting webpages on [internal lighting in historic buildings](#), and the Chartered Institution of Building Services Engineers (CIBSE) [Lighting Guide 13: Lighting for Places of Worship](#) (2018).

It is important to remember that views on acceptable lighting levels have changed over recent years; what was once considered appropriate may no longer be acceptable, as we now have far more variety and choice available. So if the existing lighting in a church is thought to be unsatisfactory, consider the reasons. Do the fittings no longer provide enough light? Is the installation unsuitable for the current pattern of worship and other uses of the building? Can switching to new lighting provide significant cost savings and help the church to achieve its Net Zero Carbon aims?

## Energy-efficient lighting

### Sensors

We have all entered churches on sunny days, only to see unnecessary lights glowing. The most efficient lighting system is one that is turned off when not needed, and turned down to the level required at any given moment. This can be achieved through a combination of user behaviour (being encouraged to switch things off), well-understood controls, and modern sensors.

There are motion sensors and heat sensors, both of which detect when people are in the building. Commonly used in bathrooms and kitchens, these can also be useful in churches that

get occasional visitors, and can reduce overall running costs. Sensors can also measure the amount of daylight and adjust each lamp accordingly, to achieve a desired goal, but this may not be appropriate in a church setting.

You should be clear to your lighting designer or consultant which parts of the buildings need to be lit, for what purpose, and at what times, and listen to your lighting consultant's advice on the use of intelligent controls. Is your church an Eco Church, or has it passed a motion working towards Net Zero Carbon, recognising the motion from General Synod? Explain to your designer/consultant that this is an important objective of the project. Ask them to recommend which sensors will be cost effective and reduce your energy use.

### LED technology

The continuing advancement of LEDs (light emitting diodes) with their superior energy efficiency and lamp life compared with almost all other lighting technology, makes LEDs the currently recommended technology for all new lighting schemes. Replacing less energy-efficient lighting with new LED technology should lead to:

- reduced energy consumption
- reduced energy and maintenance costs
- reduced carbon footprint
- increased lamp life

LED lighting is far more efficient than other types of lighting and lasts longer. Older style incandescent lamps (for example, the old 100W 'light bulb' that used to be commonplace in houses) last approximately 1000 operational hours. Fluorescent lamps typically last for 15,000 operational hours. LED, by comparison, can last between 50,000 and 75,000 hours.

### Cost, safety and maintenance

LED lighting needs to be replaced less frequently than incandescent or fluorescent lamps or tubes. Replacing light fittings less frequently reduces waste and the impact on the environment by reducing the quantity of raw material required to make the fittings. In addition, replacing lamps less frequently also reduces the installation and maintenance costs. It is also important to remember that it is the driver (the control gear) that will usually fail first so it can be a good idea to install remote drivers so that maintenance is easier.

Cheaper LEDs may prove to be a false economy as they may have a shorter lamp life. It is important to specify established manufacturers, and to remain consistent with lamp/luminaire selections (particularly in lighting projects that are phased to match funding).



St Brandon, Brancepeth

## **Using existing fittings**

The less costly option is to replace the existing lamps with new LED versions. This allows existing ornate fittings to be retained, and is quite a simple procedure for many types of bulb. However, consideration should be given to the life expectancy of the light fitting itself. Installing LED lamps into a 15-year old fluorescent fitting could prove a false economy, as the existing switchgear in the light fitting will be at the end of its life and could fail in the short term.

In situations where standard household lamps are in use within a church, hall or school, it is an excellent idea to replace these with modern LED lamps. Types with higher lumen outputs ('lumen' is a term that expresses the amount of light emitted) for the wattage should be chosen, as they provide more light for the power consumed. This may not work, however, if you have dimmers. If the church has an existing dimming system, then lamps must be chosen to be compatible with the system to avoid the risk of unpleasant flickering and potential damage to the both the dimming system and the new lamps. It may also depend on the type of dimmer employed.

## **New fittings**

Although more costly, completely replacing existing light fittings can be the better long-term solution, as the potential for short-term failure is removed. Replacing entire fittings with LED alternatives can drastically reduce the cost of running lighting by up to 80%. However, this does not apply if the fittings have heritage value, or a close association with the church, in which case they should be preserved.

All light fittings can be replaced with LED alternatives—both inside and out—including flood lighting, which many churches employ for both security and aesthetic reasons. Ceiling grid lighting and strip lights often found in halls and classrooms are also easily exchanged or replaced by modern LED alternatives.

## **Colour temperature**

An added benefit of installing LED lighting is to improve the colour of the light being emitted, or in other words, alter its colour temperature. Some light sources, such as sodium, or SON, have a dull orange glow whereas metal halides can be a very harsh cool white, both of which tend to distort the true colour of a building and its interior. The colour of LED light sources can be chosen to be warmer or cooler so that the correct colour of white can be selected to avoid such severe discolouration.

In general, for the main body of churches and cathedrals, whose interiors tend to feature wood and stone, LEDs with a warm white colour temperature (2700–3000K) are recommended. These also provide a welcoming ambient light. Other colour temperatures may be appropriate in other building areas such as offices or halls. It is recommended that a lighting professional is consulted to develop a specialist lighting design specific to the building concerned. It is also recommended that mock-ups are carried out to demonstrate the basic elements of a new scheme and to test the effects in particularly sensitive areas.

It is essential to ensure that good quality LED products are selected, as cheaper LEDs may have colour shifts and a lower colour rendering which may result in poor quality illumination.

## **Lumen depreciation and guarantees**

Unlike conventional light sources that reduce in output and eventually fail, LED products do not normally suddenly fail. Instead, the light output reduces over time. The normal convention is to measure the life from when the output has reduced by 30%, that is, when there is 70% light output remaining. This is often quoted as the L70 life and is measured in hours. It is worth checking the L70 life when choosing your lamps.

Lamps will come with guarantees, and it worth checking these carefully. Guarantees are typically for 3-5 years. However, the manufacturer will only supply you with a new bulb, not cover the cost of the labour and access to replace it. Consider purchasing higher quality bulbs for the more inaccessible lights which are difficult to replace, to avoid expensive replacements.

## Other issues to consider

### Health and safety

Under the [CDM Regulations 2015](#), the designer and installing contractor of a new lighting scheme have legal obligations to consider and minimise all risks during the lighting installation and for its future maintenance—such as reducing the height at which lighting is installed, and ensuring adequate provision for safe high-level access for lamp changes.

In association with fire risk assessment, provision should be made for the introduction of emergency lighting in accordance with [BS 5266-1:2016:Emergency lighting: Code of practice for the emergency lighting of premises](#), to provide illumination and emergency escape lighting should the supply to the normal lighting fail. See also the Historic England guidance on [emergency lighting](#).

### External lighting

Floodlighting your building can be a great means of highlighting the building within the local landscape. However, impacts such as light pollution, effect on neighbouring properties and the use of the building when the floodlights are on need to be considered. Local planning requirements for obtrusive light and minimisation of upward light and skyglow vary depending on location and the [ILP guidance](#) is free to download from their [website](#). Historic England has guidance on [external lighting](#). See also the Churchcare guidance note on [Floodlighting](#).

### Specialist advice

In your brief you need to outline any special features of interest to highlight within the new scheme but care is needed to ensure that the scheme doesn't have a negative environmental impact on those features either through UV or heat. Wall paintings or painted roodscreens, for example, will need specialist conservation advice. Your professional adviser or DAC secretary will be able to advise on finding a conservator. The Institute of Conservation (Icon) keeps a [register](#) of accredited conservators.

Bats are a protected species and light can have a significant impact on their habitat. A new lighting installation may be subject to specific statutory approvals, so if your church has bats, seek specialist advice. More information is available from [Natural England](#), the [Bat Conservation Trust](#), or the [Bats in Churches](#) project.

### Aesthetics

Any lighting scheme will require a great deal of cabling and this can be as important to a successful scheme as the type, design and location of light fittings. The aim should be to use previously used routes and fixings if at all possible, to minimise the effect on the historic fabric.

However, it is also important not to reuse badly positioned cable runs if a better alternative is available. Cables should be as unobtrusive as possible and with minimal impact to historic fabric. You will need to discuss this with your professional lighting adviser, architect/ surveyor and DAC.

In many schemes the fittings should be unobtrusive, as their function is to provide the source of light and not to be looked at. Both fittings and cables may be selected or painted in colours to blend with the background. However, fittings themselves can be considered as aesthetic, as objects of beauty, if well designed and crafted. Wherever possible, fine historic fittings should be retained and adapted and/or incorporated into any new scheme.

Well-designed light fittings can in themselves help define space within a building (for example the regular march of chandeliers or other large pendant fittings down a nave) and thereby significantly add to the quality of the visitor's experience. From the huge range of sizes and styles, you need to select something that will continue to complement your church for years to come.

## Fittings

The quality of the light fitting and the extent to which it enhances your church is something to which you should give a great deal of thought. There are many different types of fittings including up and down lighters, pendants, chandeliers and so on. Each will perform differently and the key consideration will be functionality and visual impact on the interior of the church.

You will need to seek the advice of your DAC on the impact of any new fittings. Light fittings should be designed and constructed to conform to all relevant BS and EN standards, and should carry a [UKCA](#) mark where appropriate. You need to make sure any new fittings are readily accessible for maintenance.

## Controls

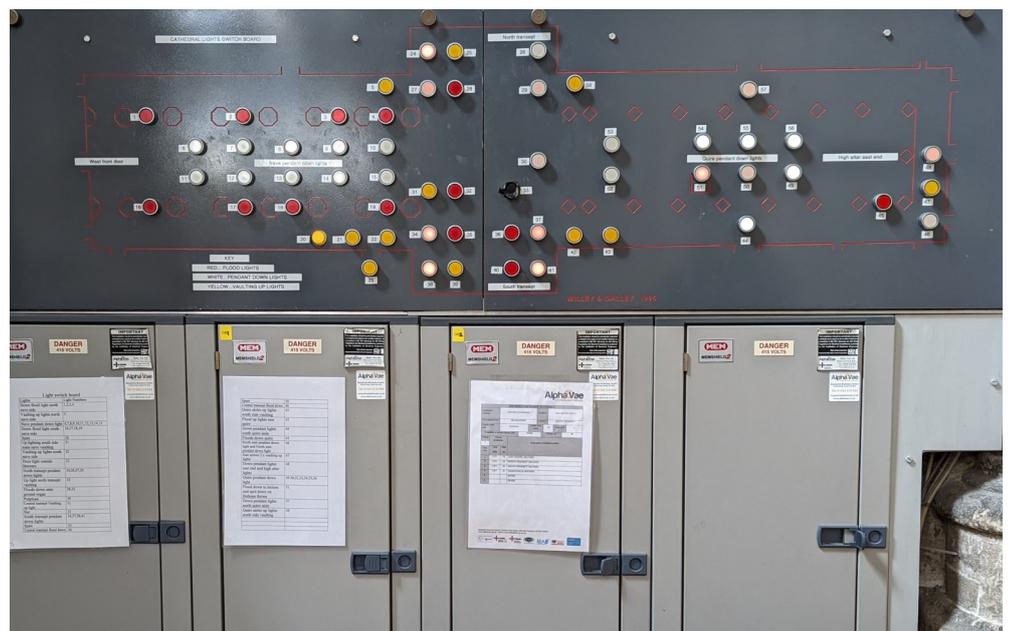
Ease of operation of the lighting system is very important. Most modern lighting systems will have a computerised control system. This will be pre-set by the lighting designer to meet your needs, and allows the system to be adjusted for different parts of the church, different events and different times of year. Make sure that at least two people in your congregation know how to use it.

## Testing and maintenance

Your lighting consultant will be able to advise on specific maintenance measures. The electric system as a whole should be tested every five years by an appropriately qualified electrician. Luminaires (light fittings) should always be kept clean to ensure ultimate performance. You will also need to be able ensure safe access for maintenance purposes.

## Trialling

It is absolutely vital to undertake proper trials of your lighting scheme with your consultant. You should discuss the required extent of the trials, identifying the more sensitive areas of the building, and where specific effects or controls are needed. Some tests need to be carried out as part of the design. Although there are cost implications, this can be a crucial time to notice any problems or omissions and rectify them. The cost of trialling is going to be a lot less than the cost of not trialling. Lighting comes with wiring and power supplies, and those will also need to be considered from early on in the process. Any proposed changes to the wiring or lighting must be approved by the church's insurers.



The lighting controls at Exeter Cathedral

## Further information

### Conservation of artworks, fixtures and fittings

Should specialist advice be needed on the effects of light on sensitive fixtures and fittings, the Institute of Conservation (Icon) keeps a [register](#) of accredited conservators.

### Design

Lighting design guidance can be obtained from CIBSE and Historic England.

[Lighting Guide 13: Lighting for Places of Worship](#)

[SLL Code for Lighting](#)

[Internal lighting in historic buildings](#)

[Lighting in places of worship](#)

### Electrical wiring

For more information refer to the British Standards Institution's [BS 761:2018 IET Wiring Regulations](#), and also our Churchcare guidance on [electrical wiring](#) in churches.

### Emergency lighting

For more information refer to the British Standards Institution's [BS 5266-1:2016:Emergency lighting: Code of practice for the emergency lighting of premises](#), and Historic England's guidance on [emergency lighting](#).

### Energy efficiency

Advice on energy efficiency is available from the Church of England's [Energy Footprint Tool](#), and Historic England's webpages on [Energy Efficiency and Places of Worship](#).

### Floodlighting

The Institution of Lighting Professionals (ILP) has produced guidance on [The Reduction of Obtrusive Light](#) (2021), which is free to download from their [website](#). See also Historic England's guidance on [external lighting](#), and our Churchcare guidance document on [Floodlighting](#).

### VAT

The [Listed Places of Worship Grant Scheme](#) will repay the full amount of VAT incurred on new lighting schemes – including the light fittings, and security lighting, for listed churches.

