

## How to improve the effectiveness and cost of your lighting? A guide for small hotels, guest houses and B&Bs

As a provider of tourism accommodation you will be only too aware that the quality of artificial lighting is an important factor affecting visitors' enjoyment of their stay - did you know it can account for up to 40% of your business's energy use? Recent advances in lighting technology, such as LED bulbs may have led you to consider whether you could improve the effectiveness and cost efficiency of your lighting. However, the proliferation of the new technology products available and their significant purchase cost is leaving many businesses uncertain of when and how to invest in more efficient lighting.

This guide and accompanying spreadsheet will enable you to:

- undertake a lighting audit of your business. Does your existing lighting meet the needs of staff and guests? Is there potential for improvements to fittings and controls to deliver energy savings. Our spreadsheets will help you to gather data and calculate your current spend on electricity for lighting.
- design an energy efficient lighting scheme. Based on the data gathered from your lighting audit you can identify options for implementing an energy efficient lighting scheme.
- calculate the cost and payback time for the different options identified above.

Follow our three stage process to carry out a lighting review of your property;

**Stage 1: Carry out a lighting audit**

**Stage 2: Identify energy saving options which might be appropriate for your business**

**Stage 3: Cost the options to work out which is right for you.**

August 2012

## Stage 1: Carry out a Lighting Audit

Print off the data collection sheets (see below) for each room/area in your establishment (If your bedrooms are fairly standard in design you only need to complete one copy per room type). Then take a walk round your business premises, including front and back of house, grounds, gardens, and outbuildings, filling in the yellow columns as you walk round.

Once you have collected data for each room/area you will need to go back to your computer, open spreadsheet 1 and enter the data you have collected. Remember to complete a separate spreadsheet 1 for each room type. Spreadsheet 1 will then automatically calculate the figures for 'Energy Consumption per year for each room type in kWh per annum'.

Now you are ready to move on and enter some additional data into Spreadsheet 2 in order to calculate your total lighting costs.

Once you have entered all your data save this spreadsheet with the file name '*Current lighting Costs, date of audit.xls*'

## Stage 2: Identify energy saving options which might be appropriate for your business

Now is the time to take a look at the information calculated by the spreadsheets and work out what it means for your business.

Key points you need to consider are;

- Your lighting cost as a % of total electricity consumption. This will provide you with an idea of how much of your electricity bill you can influence by reviewing your lighting.
- Which of the areas/rooms in your business cost the most to light. This is a composite factor dependent on the bulb type, number of bulbs, the length of time they are used and the cost of replacing failed bulbs.
- Whether you are happy with the level of lighting your existing scheme provides (bearing in mind your responsibilities under Health and Safety legislation). Consider the areas which are most costly to light first - Is the room over lit or under lit? Is there adequate lighting for the specific task areas? Do you need the lights on during daylight hours? Could you improve the use of daylight by changing the decor or soft furnishings?
- To what degree is your lighting automatically controlled?

You should now be in a position to evaluate which energy saving options might be appropriate for your business.

August 2012

Your options are as follows;

### **Change your lighting policy to ensure staff know how to control lights efficiently**

Involve your staff in the development of a lighting policy. A lighting policy outlines which lights you require on at what time, and who controls lighting levels. Your lighting policy should include details of who has responsibility for controlling lights and at what time/circumstances lights should be switched on/off, as well as details of which bulbs are to be used in which fittings. With your staff consider whether the existing control policy as identified in Section 3 is adequate for each area. Or whether by changing staff responsibilities, providing better information, or changing control mechanisms you can eliminate wasteful use. In your lighting policy include responsibilities for adjusting window blinds/curtains to maximise daylight.

### **Make the most of natural light:**

Light coloured walls and ceilings will aid the distribution of daylight in rooms. Curtains and blinds can be designed and fitted so that they still look great, but obscure as little of the window as possible. If your review shows that you could reduce daytime use of lights by changing your interior decor to make the most of natural light then you should incorporate this into your maintenance/ refurbishment programme.

The use of daylight sensors can help optimise the balance between natural and artificial light so that the artificial lights are dimmed to balance the daylight and deliver a constant light level for staff and guests. The section 'Installing lighting controls' below has further information on sensors.

### **Replace and upgrade your light fittings;**

If you are redecorating or refurbishing this is also the time to consider whether you can improve the efficiency and cost of your lighting by changing the number, position or type of lights in a room. If you are changing the type of lights in a room to a more energy efficient bulb type such as LED (See our guide to light bulb technologies below) then you will need to consider how many bulbs you will need to deliver the level of light you require. It may seem excessive to replace existing wiring arrangements but it should still be considered, as the benefits of making a deeper refurbishment can more than outweigh the cost and inconvenience.

### **Change the bulb type used in your existing fittings:**

Light bulb technology and design has undergone a revolution in recent years. Our guide to light bulbs below shows how light bulbs are becoming increasingly energy efficient and now have longer lifespans.

**August 2012**

Most people are familiar with the compact fluorescent energy saving bulb (CFL) but are often unhappy with the way they look, their lifespan, their light output and the time they take to reach full intensity - this has caused some people to be put off energy efficient lighting. However, LED bulbs have now 'come of age' and are well worth considering. LEDs are available in a wide range of fittings and so in many cases can be simply retro fitted into existing lamps. They are more energy efficient than CFLs, such that a 5 watt LED may replace a 50 watt halogen lamp, and they have an even better life expectancy of between 25,000 to 50,000 hours. At present the cost of good quality LED bulbs seems high compared to alternatives however, their longer lifespan and lower energy consumption should be taken into account when comparing costs and payback times. Stage 3 below will help you compare costs.

When considering changing bulb type make sure your new bulbs have the colour appearance you require. Most LEDs are now available in a range of colours with 'warm white' being the most appropriate for guest areas.

### **Installing lighting controls**

Lighting controls enable you to make sure you are only paying for lighting where and when it is needed. They can also improve comfort and reduce maintenance costs.

There are four types of lighting controls most suitable for tourism businesses:

**1. Manual on/off switch**

Provide guests and staff with control over their environment, but liable to being left on when not needed.

**2. Movement Sensor** (usually passive infra red (PIR)) - occupancy control.

Particularly suitable for toilets and corridors they can either switch on the light whenever they sense movement and then switch the light off when the space is vacant, or be switched on manually, with the sensor switching the lighting off when the space is empty.

**3. Time Clock** - timed schedule

Particularly suitable for exterior lighting which can be set to switch off late at night.

**4. Light Sensor** - sometimes called 'photocells'

August 2012

Designed to measure natural light levels and use this information to determine whether artificial lighting should be on, off or dimmed. Can be used with a dimming control to integrate artificial and natural lighting in order to provide relatively constant light levels, this is particularly useful where a lot of daylight comes into a building.

It is possible to combine controls, for example presence detection and daylight controls, in a single lighting control unit to maximise efficiency. The most effective control strategy is;

- Request on - via manual switch
- Auto off - via a control mechanism

Prices for PIR/timers/photocells start at around £15. The cost of installing lighting controls is highly dependent on your existing wiring, so you would need to discuss the possibilities with an electrician.

It is worthwhile considering zoning your lighting controls so that separate lighting circuits (along with separate switches) are used to light different parts of a room can ensure that only those zones that are in use are lit. Creating separate, independently controlled zones means that you can switch off or dim lights in certain areas and increase it in others. For example you could switch off lights near windows to take advantage of natural daylight, but keep them on further into the room. This is particularly worth considering when you are refurbishing.

### **Stage 3: Cost the options to work out which is right for you.**

You will now need to do some research to work out how much these options will cost your business and how long it would take you to pay back that cost from the savings made by lowering energy consumption and frequency of bulb replacement (Payback Time).

Put simply;

Payback time = Estimated savings to be achieved per year divided by the cost of purchasing and installing energy saving measures

### **Using the spreadsheets to calculate the costs of different energy saving lighting options for your business**

Save a new version of your completed Spreadsheet as '*Energy Saving Lighting Costings.xls*'. In this version you will be able to play with the figures to work out the energy savings possible by implementing the options outlined above.

Start with the options with the lowest cost to implement first, i.e. changing your lighting policy. So if you think you can reduce the number of hours lights are on in an area by implementing a lighting policy, change the 'number of hours' column in Section 2 to

**August 2012**

see what impact that will have on your lighting costs. Similarly you can cost the potential savings from installing better controls in high use areas. If you want to see the savings to be gained from replacing the bulbs in your dining room with LEDs, then change the energy rating of the bulbs (B) in Section 2, and the number of bulbs changed each year in Section 5. In this way you can play around with different combinations of energy saving options. You can save each set of changes under a different filename to enable comparisons to be made.

The knowledge gained from manipulating the figures as outlined above should give you the confidence to know the most cost effective actions you can take to reduce your lighting costs and become more energy efficient.

Now you can consider how to incorporate investment in lighting efficiency into your business plan. The decisions you make based on your lighting review will depend on the status of your business; for example are you planning to redecorate or refurbish in near future? If you are, then this is a great opportunity for you to maximise the use of natural light through your choice of wall colour and soft furnishings, as well as incorporating the most up to date lighting technologies in an efficient and effective lighting scheme to deliver the ambiance your guests expect, whilst minimising your electricity bills. If you have no plans to redecorate then you still have great potential to refurbish your existing fittings with up to date lighting technology to significantly reduce the amount of electricity you use.

## Guide to light bulb technologies

Incandescent Tungsten Filament	Tungsten Halogen (quartz halogen)	Fluorescent	LEDs
			
<p>The traditional light bulb which produces a good quality light.</p> <p>They generate a lot of heat which wastes energy and so are expensive to run</p> <p>They have high maintenance costs associated with their relatively short, 1,000 hour life span.</p>	<p>A compact light source which can be focused and directed so is often used for spot lighting.</p> <p>Some operate at 12 volts and require a transformer (MR16 bulbs), others operate at mains voltage (GU10 bulbs).</p> <p>They have a high heat output but are more efficient than tungsten lamps.</p> <p>They have a life span of between 2,000 to 5000 hours.</p> <p>Halogen bulbs should not be handled with bare hands, as oil from the skin can cause the glass to crack when the light is switched on.</p>	<p>Tubular fluorescent lamps are more efficient than incandescent lamps and can last up to 18 times longer.</p> <p>Compact fluorescent lamps (CFLs) often look like standard tungsten filament lamps but work in a similar way to fluorescent strip lights.</p> <p>They have a life span of about 15,000 hours.</p>	<p>Light emitting diodes (LEDs) use a semi conductor to produce light without heat or noise, therefore they are very efficient.</p> <p>The new generation of LEDs have a long (30,000 to 50,000 hours) life span.</p> <p>They can often be fitted into existing fittings. GU10, MR16, bayonet and screw fitting, and T* strip LED bulbs are available</p>
Dimmable	Dimmable	Majority not dimmable	Dimmable LEDs available
Immediate start-up	Almost immediate start-up	Delayed start-up	Immediate start-up
10-20 lumens/Watt	10-30 lumens/Watt	30-90 lumens/Watt	50-100 lumens/Watt
<p style="text-align: center;">Increasing lifespan and energy efficiency of bulb</p> 			

LIGHTING AUDIT DATA COLLECTION SHEET		
	Room Type (complete a separate form for each room/area in premises eg reception/bedroom type 1/bedroom type 2/dining room/kitchen etc.)	Lounge
Section One	Tasks undertaken in room/area	
	Mood/Ambiance you want to create	
	Light levels during daylight hours	
	Are walls/carpet light or dark colours?	
	Do soft furnishings obscure windows?	
	Are lighting levels fit for purpose?	

August 2012

Section Two	Light Fittings						
	Fitting type: eg. pendant/table lamp/spot/strip/chandelier	Bulb type: eg. tungsten/halogen/compact fluorescent/fluorescent/sodium/LED	Bulb light output (if available, measured in lumens)	Number of Bulbs (A)	Energy rating of bulb in Watts (B)	Number of hours per day lamp is lit (D)	Average number of days room is occupied per year (E)
<i>Example</i>	<i>table lamps</i>	<i>compact fluorescent</i>		<i>3</i>	<i>15</i>	<i>4</i>	<i>219</i>
	<i>chandelier</i>	<i>tungsten filament</i>		<i>9</i>	<i>10</i>	<i>24</i>	<i>365</i>
<b>Your Data</b>							
<b>Section Three</b>	Lighting Controls						
	<b>Light Fitting</b>	Control mechanism eg. manual switch/timer/sensor			Who is control of switch, or of setting timer? eg. all staff, certain staff or guests		