



# SMATE

## Save Money And The Environment – Lighting your home with LED

Cost saving tips to help you save money and the environment  
with a change to home lighting

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## Contents

Introduction .....	1
The key criteria to understand.....	2
Rules to follow to ensure success.....	2
Energy Saving Estimate.....	2
Definitions.....	4
Bulb types and fittings .....	4
What bulbs to use in which fittings .....	5
What colour Temperature means.....	6
Light Beam Angle .....	7
Ambient, Task and Accent definition.....	8
Colour Rendering Index (CRI).....	9
Sources.....	9

## Introduction

SMATE gives you some easy ways to get your green-on whilst saving yourself some serious money. Changing your home to use LED lights everywhere cannot just pay back in savings quickly, but also make a serious difference to the emissions associated with your home.

This documents main aims to act as a guide for changing bulbs like for like. There are additional benefits having reduced your power consumption that can be obtained for health and well-being by evaluating how you use ambient, task or accent lighting throughout the home. Especially given the drive to home working.

There are many guides on the internet that can help as this is something that has matured into standard practice for most.





## The key criteria to understand

- The type of bulb – Its fitment type, shape & size
- The lumens from the bulb – The amount of light the bulb creates
- The light output shape – The beam angle of light from the bulb
- The colour of the light (especially white lights) – every type of white light has a colour temperature associated with it (expressed in Kelvins (k))
- The ability of the light to reproduce colour – Measured as CRI (Colour rendering Index)
- Is the bulb connected to a dimmer switch?
- Is the bulb connected to a low voltage transformer?

## Rules to follow to ensure success

- 1) Determine as much about the bulb you are replacing as possible. If you can determine the manufacturer you can often find details on the bulb online. Look all around the bulb for printing that can help.
- 2) The 3 most important aspect to determine is the number of lumens, the colour temperature, and the CRI.
  - a. The lumens will allow you to match the amount of light produced (so match the lumens needed not wattage)
  - b. The temperature will ensure you retain the same colour (so match the temperature not the name the manufacturer has given it)
  - c. The CRI will ensure you retain the same look on objects illuminated by the bulb (ensure you have at least the same CRI, but also think about using high CRI bulbs as they can bring the colours in your room to life.
- 3) If the bulb is connected to a dimmer switch or transformer will it support the significant reduction in power needed? Some older equipment has minimum amounts power needing to be drawn to work. However almost all dimmer switches are easy to replace with ones designed for use with LED. For transformers you could always use a LED bulb that needs more power (it most likely means a much brighter (higher lumen) light will result.
- 4) Look at the number of hours use the bulb is rated for. A more expensive, much longer life bulb may way be cheaper over its lifetime.
- 5) Check you are matching the beam angle of your replacement bulb, so you illuminate the space in the same way.

## Energy Saving Estimate

With energy consumption being a major component of household energy bills it is typical to expect your money back from switching to LED within 2 years (often faster).

Given that LED bulbs last much longer than other bulbs types means that over the lifetime of the bulb you can make significant savings.

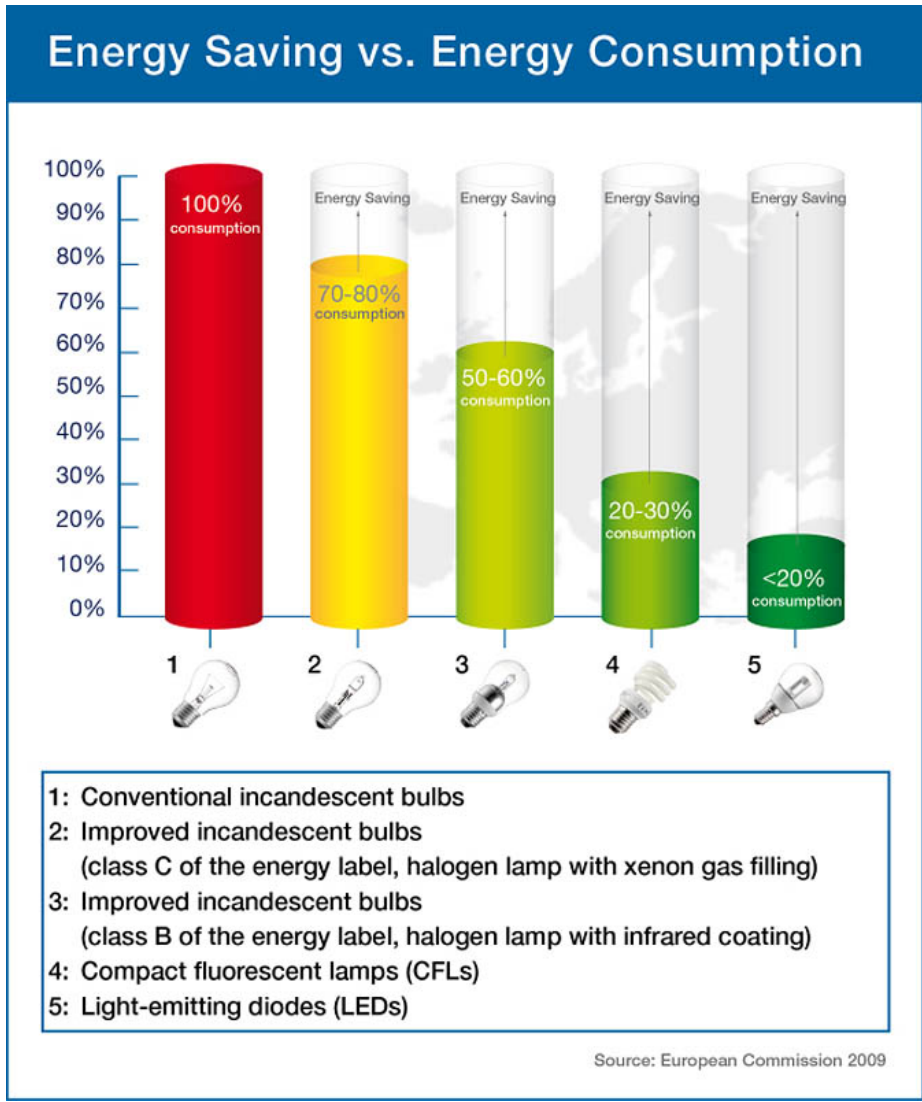
Having LED lights is also a factor that can help with your EPC rating which is useful if you are selling your home or looking to rent it.

An exact saving will depend on how much you pay for each kilowatt of energy and how much you pay for the bulbs. My own experience says that if you can look for something of slightly better quality, which might be slightly more expensive, often delivers the best result.



Remember you are unlikely to have to change the bulbs again for a very long time. So, whatever you choose needs to create the environment that your happy with for a long time.

Philips YouTube video (click on image below to view)





Definitions  
Bulb types and fittings

Figure 1

### common light bulb shapes



Figure 2

### common light bulb fittings





What bulbs to use in which fittings

Figure 3

## What bulbs to use in which fittings

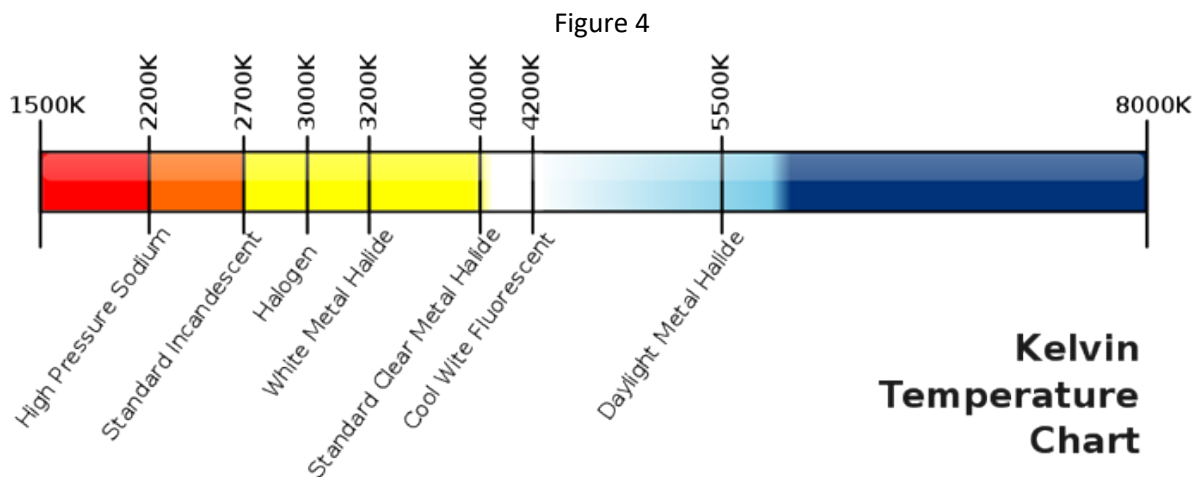
Fitting Type	Over Head Bulbs			Spotlights	Lamps, side lamps & chandelier fittings		
	Traditional	Stick	Spiral	Down light /Reflector	Candle	Globe	Golf
B22	✓	✓	✓				✓
B15	✓				✓	✓	✓
G14		✓	✓		✓	✓	✓
G27		✓	✓		✓	✓	✓
GU10				✓			
GU4				✓			
G5.3				✓			
MR16				✓			



## What colour Temperature means

Temperature is measured in the unit Kelvin and is the standard method for measuring the colour of light emitted from a lamp. The reason why this colour measurement is using a temperature unit the Kelvin is because it is correlated by observing the colour of a piece of steel when heated to the prescribed temperature.

Most manufacturers of lamps will use terms such as cool white, warm white etc. It is the number that will allow you (when combined with CRI) to match bulb colours in a space.



LED's are often marked with words to describe the temperature

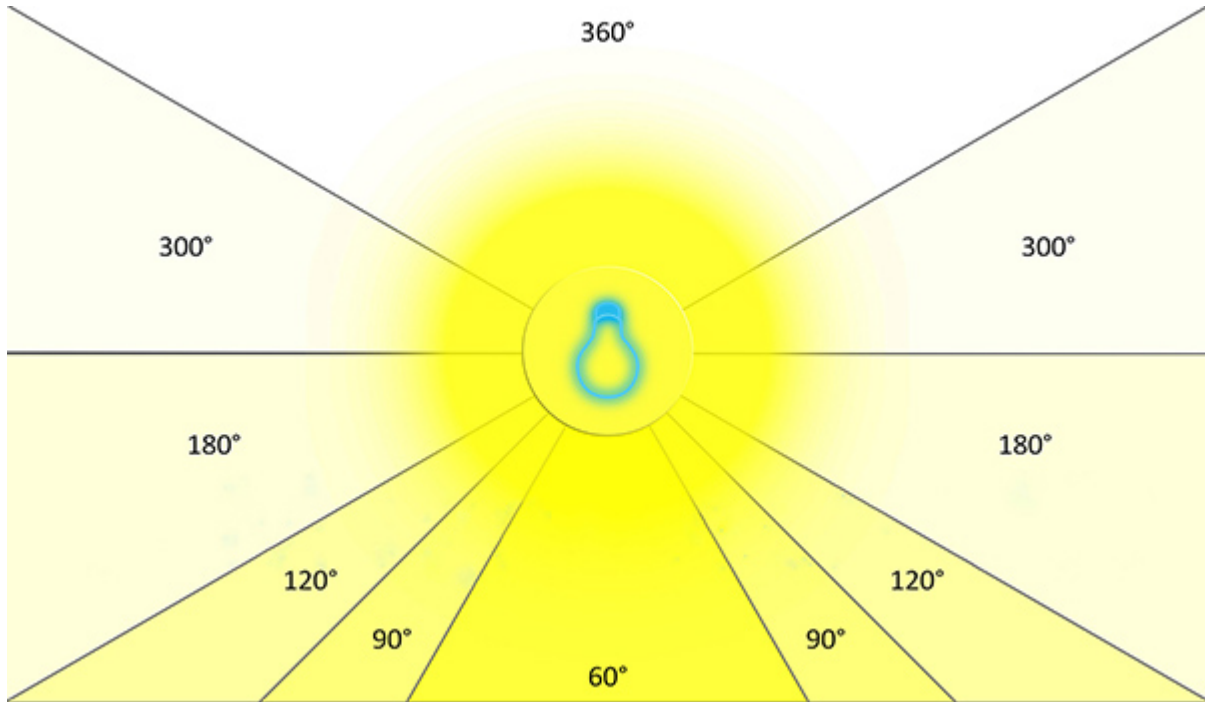
- 3/4K is a yellow / white light often referred to as warm
- 4/5K is often referred to as white
- 6K and above is referred to as both blue and cool white



## Light Beam Angle

Each bulb radiates light at different angles (see below). It is important when replacing bulbs like for like to match this angle. In general task lighting tends to have narrow angles to illuminate the specific task its designed for. Ambient lighting tends to use bulbs that radiate light up to 360degrees meaning an even distribution of light around the space being lit.

Figure 5



Example for downlights

Figure 7

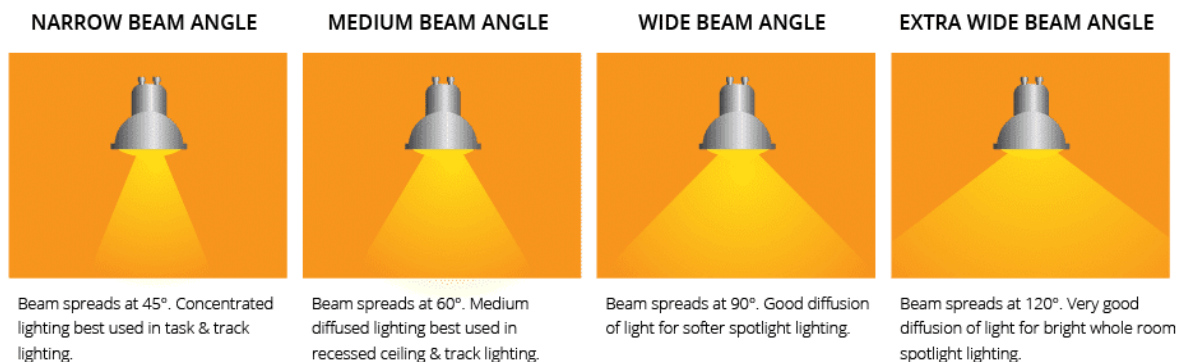






Figure 8

## 3 different types of lighting



**ambient lighting** provides a room with overall illumination, giving a comfortable level of light to the whole room.

**task lighting** is designed to help you perform specific tasks that need direct light, such as reading.

**accent lighting** uses light to highlight points of interest in a room such as paintings or plants.

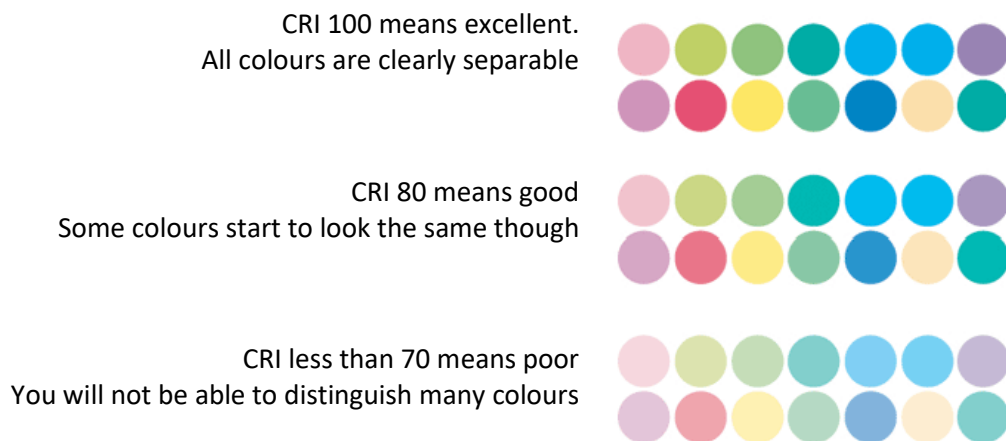


## Colour Rendering Index (CRI)

Definition of CRI - A **colour rendering index** (CRI) is a quantitative measure of the ability of a light source to reveal the colours of various objects faithfully in comparison with an ideal or natural light source.

So in general, the lower the CRI number associated with the bulb the harder it is to distinguish between colours viewed under the light from that bulb. We recommend bulbs are chosen with a CRI value of > 80 to avoid disappointment.

Figure 9



Example of an Apple with a warm white light applied at different CRI numbers

Figure 10



## Sources

- Philips you tube video
- Various images from the internet
- Industry knowledge (Jeremy Cottam)
- Experience of changing homes to LED (Adrian Abbs)