

# Bright Ideas Tipsheet 50p

A guide to saving energy, and money, with energy efficient lighting.



Centre for  
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Publications

Machynlleth, Powys SY20 9AZ / Tel. 01654 705950 / Fax. 01654 702782 / email. info@cat.org.uk / website. www.cat.org.uk

Low energy light bulbs have improved a lot in the last few years. Prices have dropped dramatically, the range has increased to include candle, spot-light and globe bulbs, and problems with flickering have been overcome. The first step to energy efficiency has never been easier – you can save money, and help the environment, just by changing your light bulbs.

## Traditional bulbs

Incandescent bulbs, also known as 'tungsten' or 'General Lighting Service' (GLS) bulbs, are the traditional type that many of us still use. Light is generated when an electrical current is passed through a thin metal wire, and the wire becomes hot and emits light. Only 10 per cent of the electrical energy is converted to light, so 90 per cent of the energy that goes into them is wasted as heat.

## Energy Efficient Bulbs

Also known as 'compact fluorescent lamps' (CFLs), energy efficient bulbs and fluorescent strip lights are much more efficient than other light bulbs because their operating systems use electricity to produce light, not heat. The fluorescent tube in strip lights and CFLs is coated with a thin layer of phosphorous powder which absorbs ultraviolet radiation when a small amount of mercury in the tube reacts to an electrical charge.

CFLs are available in standard bayonet and screw versions, and in a huge range of shapes and sizes. They are small enough to fit into a standard light fitting and last up to 12 times longer than standard incandescent bulbs. Most importantly, they use 75-80 per cent less electricity than their technologically backward incandescent rivals.

CFLs have a ballast (the bulky bit at the bottom) which reduces general flicker and switches the light on instantaneously. Early CFLs used magnetic ballasts, which are larger, bulkier and heavier than the electronic ballasts now used. Electronic ballasts are more efficient and produce light of a better quality, without the problem of flicker and hum often associated with magnetic ballasts. However some of the cheaper bulbs on the market still use magnetic ballasts. Even with the electronic ballast, it may still take a couple of minutes for the bulb to 'warm up' and reach its full light output. It is possible to get external ballasts with adapters, which means the bulb and not the ballast is discarded at the end of the bulb's lifetime – a more efficient use of resources. However, most commonly found CFLs come as one unit.

## Lumens, Watts and energy efficiency

Light is measured in Lumens, and power in Watts. The lighting efficiency of a bulb is thus expressed in units of 'Lumens per Watt' (LPW). Traditional incandescent bulbs give 12-20 LPW, with

bigger bulbs producing more LPW. Energy efficient bulbs have much higher LPW ratings, between 50 and 70 LPW – which is why an energy efficient bulb rated at a lower wattage produces the same amount of light as a higher rated incandescent bulb.

For example, a 25W CFL that produces 70 Lumens per Watt will emit  $25 \times 70 = 1750$  Lumens, about the same as a 100W incandescent bulb. In other words, in this example an energy efficient bulb uses one quarter of the power to give the same effect!

## The cost

CFLs are significantly cheaper than they were a few years ago. You can now buy CFL bulbs for as little as £1.50, though prices vary greatly and £3 to £10 is what you might normally expect to pay. Even at this price you will save a considerable amount of money in use over conventional bulbs. A 15W CFL – equivalent to a 60W conventional bulb – costing £5 would pay for itself after about 1,600 hours of use (within about a year, if it's used for an average of 4 hours a day) and over its 10,000 hour lifetime could save over £32. If CFLs are run for long periods of time without being switched off – outdoor security lights or in shop windows, for example – their lifetime can be extended. If you get your CFL for free (see later) or at a discount through an energy saving scheme, you will of course save even more!

## Electricity consumption

At the moment, lighting accounts for around 16 per cent of domestic electricity consumption, with the average house having around 22 light bulbs. The number of light bulbs, and electricity consumption, is set to increase hugely by 2010.

If every household in the UK replaced two GLS bulbs with CFLs, electricity consumption for lighting would drop by 40 per cent, a saving of 11,985 GWh per annum (more than Sizewell B nuclear power station produces each year).

## Pollution

Unlike incandescent bulbs, CFLs contain mercury, (although current research is looking at ways of reducing the amounts). But remember fossil fuel power stations also emit mercury, so using CFLs, which use less electricity and less fuel, reduces the total amount of mercury emissions.

The starting mechanisms of magnetic ballasts contain some radioactive materials, which are reabsorbed when the bulb is in use. However they can be released on disposal. Electronic ballasts do not contain radioactive materials.

At the end of their life CFLs can be recycled, recovering the radioactive materials, mercury and phosphorous, with which the



bulbs are coated. There are recycling systems in place across Europe and some facilities are available in Britain. Contact Waste Watch for further information about disposal (see below).

### Energy labelling

Household bulbs are now labelled according to their energy efficiency. The classification system grades bulbs from A to G, with class A having the highest efficiency. Labelling will also show light output (Lumens), power consumption (Watts) and the life of bulb (hours).

### Schemes

There are many local schemes that either give low energy light bulbs away for free, or offer a discount to promote their use. Contact your nearest Energy Efficiency Advice Centre (see below) to find out what is available in your area. Try your electricity supplier as well, to see if they are offering free or discounted bulbs.

### Tips

Frequently used light sockets should get CFLs first. CFLs are ideal to fit in places where access is difficult or dangerous – because they last longer, you won't have to change them so frequently.

Choose the right bulb for the right situation. GLS bulbs radiate light all around them, whereas CFLs emit light sideways. If you want to mount a light on a wall, for example, you should choose a 2D CFL. Bulb retailers and manufacturers, or your local Energy Efficiency Advice Centre, should be able to advise you on the most suitable bulb for any given situation. Most CFLs will not work with dimmer switches, or timing devices (unless you have special fittings and control gear).

The lifetime of good quality CFLs, using electronic ballasts, is not affected by frequent switching on and off. Leave lights on only if you are leaving the room for a very short while – generally it is better to be in the habit of switching them off.

If the lights are used outdoors, they should be enclosed in a sealed unit to provide thermal and environmental protection, as their effectiveness may be affected by cold conditions. From tests, domed and globe shaped CFLs seem not to dim in cold conditions and their running costs are slightly lower, but they are slower to start than other available CFL shapes.

There are so many brands and designs available on the market now that it is impossible to recommend one particular make or model. Most major light bulb manufacturers have a range of low energy light bulbs. You can often find really low priced bulbs in DIY and home stores, or you can support smaller shops by buying mail order. CAT supplies some low energy bulbs by mail order. Tel: 01654 705959 or see [www.cat.org.uk](http://www.cat.org.uk) for details.

### The future

If the Building Regulations were revised so that a number of light fittings with integrated ballasts were compulsory in new buildings, electricity consumption for lighting would be reduced dramatically. Owners would be less likely, or unable, to revert to using GLS bulbs and CFLs would work out even cheaper because only the fluorescent tubes need be replaced, rather than the whole unit.

Light Emitting Diodes (LEDs) – which are often used in bicycle lights and standby lights on electrical equipment – are a promising technology for future energy saving because they can potentially produce more light per unit of energy than CFLs and have extremely long lifetimes – up to 100,000 hours. Red LEDs have been around for a while, but white LEDs suitable for household lighting have taken longer to develop. Although LED light bulbs are commercially available and falling in cost, they are not yet a straightforward replacement to more conventional lighting technologies. They are likely to become more widespread in the near future.

### Energy efficiency investments and payback time

Energy efficiency is not just about being environmentally responsible, it can also be a financially rewarding investment for your money.

How does this work? Consider Alice and Bob, neighbours who use roughly the same amount of energy. Alice is very interested in energy efficiency and is happy to invest some of her money in making energy efficiency improvements in her home. Bob isn't too keen – he'd rather use his money to make a traditional investment in a building society. As a first step, Alice decides to replace all of the incandescent bulbs in her home with energy efficient ones. This will cost her, on average, around £80. Bob, who thinks he's playing it safe, puts the same amount, £80, into a building society account at 4% interest.

Over the lifetimes of the CFLs – about 11 years, Bob has made about £43 in interest on his original £80. By switching to energy efficient bulbs, however, Alice has paid a lot less in electricity charges, and hasn't had the cost of replacing incandescent bulbs that have much shorter life spans than CFLs.

Over 11 years, Alice will save about £78 on each of the two most-used bulbs in her house. (See the table below for a detailed breakdown of how this works.) That's money in her pocket, and so on these two bulbs Alice has made a profit of £156 by changing them to CFLs. That's £113 more than Bob made by putting his money into a building society.

Actually, Alice has saved even more than this – because all of the other bulbs in the house will also use less electricity and need replacing only after 12,000 hours of use, rather than 1,000 for incandescent bulbs. However, it becomes more complicated to work out exactly how much she will save for each bulb, because some are used more than others, and everyone's light usage is different.

It's clear from this example that investing in energy efficient bulbs in the home will offer an excellent return for Alice, or for you, and as electricity prices rise, the more energy efficient CFLs will become even better value for money!

	100W GLS	20W CFL
<b>Bulb cost</b>	£0.50	£3.70
<b>Lamp life (hours)</b>	1,000	12,000
<b>Total lamp cost (over life of 1 CFL)</b>	£6.00	£3.70
<b>Total electricity cost (over life of 1 CFL)</b>	£94.80	£18.96
<b>Total costs</b>	<b>£100.80</b>	<b>£22.66</b>

### Savings through the use of CFL instead of 100W GLS: £78.14

Source: Energy Saving Trust. On average, the two most-used bulbs in the home are used for 1,100 hours per year, giving an approximate lifetime for CFLs of 11 years.

### Further information

- Energy Saving Trust, energy efficiency for homeowners  
hotline: 0845 727 7200 web: [www.est.org.uk](http://www.est.org.uk)  
The Energy Saving Trust promote better energy use and give advice to homeowners about energy efficiency, insulation and renewable energy technologies.
- Waste Watch  
web: [www.wastewatch.org.uk](http://www.wastewatch.org.uk)  
Information about recycling your energy efficient bulbs at the end of their life.
- Energy Efficiency Advice Centre  
tel: 0800 512 012 web: [www.energy-advice.co.uk](http://www.energy-advice.co.uk)  
Energy saving tips and a free home energy checkup.