

CFL (Energy Saver) light bulbs vs. incandescent light bulbs

by Andreas Knerr for MADISON SOLAR ENGINEERING www.madisonzim.com



The main downside with traditional light bulbs is that they use only 10 percent of their energy to produce light, burning off the rest as heat. They've wasted 90 percent of the electricity people have been feeding them for the past 130 years — electricity that was mainly generated from coal and other fossil fuels. US Congress put its foot down with the 2007 energy bill, introducing tougher efficiency rules that are expected to crush the market for incandescent bulbs beginning in 2012. Within a few years, the ever-cheaper CFL may dominate the lighting market. Incandescent light bulbs are being phased out in

Australia and Germany and are illegal to sell in future. They have been replaced by CFL or LED lights implemented by law.

What Are CFL Light Bulbs?



CFL stands for compact fluorescent lamp. Unlike the long, sometimes cumbersome fluorescent tube lights found in garages and basements everywhere, CFL bulbs are smaller and often fit in lamps and other receptacles that accommodate classic incandescent light bulbs.

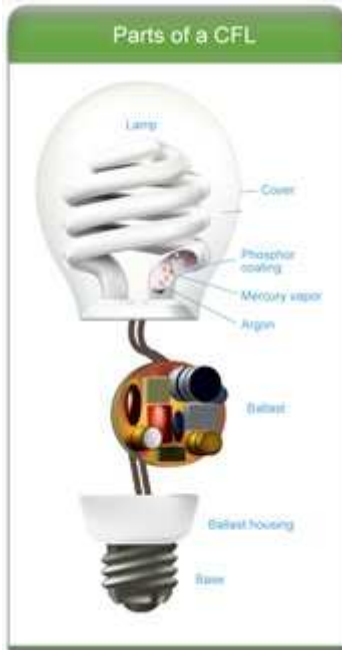
The origin of the CFL dates back to the 1890s, although the contemporary technology was patented in 1941 by a combination of efforts by General Electric and a gentleman named George Inman. This fluorescent recipe was further developed into modern CFL products in the early 1970s by a G.E. engineer.

Interestingly, while the advanced technology worked well, G.E. decided the cost to construct new manufacturing facilities was unacceptable – people weren't responding to the "going green" philosophy at that time.

Since industrial secrets seldom stay hidden for long, the design became available and other manufacturers decided to produce these energy saving light bulbs.

The two major parts of a CFL are identical to those found in classic fluorescent tubes: A gas-filled tube (in this case a circular spiral) and a magnetic (or electronic) ballast are necessary components. Those CFLs made to replace incandescent bulbs

also include the historically-named "Edison screw", the brass threaded light bulb part that you twist into incandescent light fixtures. These are commonly called "integrated CFLs."



How do CFLs work?

CFLs produce light differently than incandescent bulbs. In an incandescent, electric current runs through a wire filament and heats the filament until it starts to glow. In a CFL, an electric current is driven through a tube containing argon and a small amount of mercury vapour. This generates invisible ultraviolet light that excites a fluorescent coating (called phosphor) on the inside of the tube, which then emits visible light. CFLs need a little more energy when they are first turned on, but once the electricity starts moving, use about 75 percent less energy than incandescent bulbs. A CFL's ballast helps "kick start" the CFL and then regulates the current once the electricity starts flowing.

Older CFLs used large and heavy magnetic ballasts that caused a buzzing noise in some bulbs. Most CFLs today use electronic ballasts, which do not buzz or hum.

1.) CFL ENERGY SAVER PROS & CONS

PROS:

Very long life

- ✓ A lifespan of 6,000 to 15,000 hours is common for CFLs. Compared to the typical 600 to 800 hours of most incandescent bulbs, this is a strong advantage for CFLs.

High energy efficiency coefficient

- ✓ Always on energy diets, CFLs normally consume only one-fifth to one-third of the power of similar wattage incandescent bulbs.

CONS

Cost

- ✚ CFLs are declining in price, but are still more expensive than incandescent bulbs. The long life of compact fluorescent light bulbs will pay you back, but you'll have to invest around three to ten times more at the beginning.

Start-up delay

- ✚ Incandescent bulbs give you light immediately upon supplying electricity. CFL light bulbs take a short while to get up to speed. If it's cold, they'll take a bit longer as the gas heats up.

CFLs contain small levels of mercury

- ✚ This fact concerns both landfills and waste incinerators as released mercury contributes to water and air pollution. A few discarded CFLs pose little problem, but large volumes of bulbs could have a measurable effect.

2.) INCANDESCENT BULBS PROS & CONS

PROS:

Low cost

- ✓ You can purchase incandescent bulbs of all sizes and colours for little money.

Reliability

- ✓ Turn on the electricity and you have light. You'll have light until the filament finally breaks, usually from 750 to 1,000 hours.

CONS

Not energy efficient

- ✚ Incandescent light bulbs generate heat, using more energy than otherwise necessary to provide the light you need. In fact, of the energy used to light an incandescent bulb, 90% is used to produce heat and only 10% delivers the light. Except for a few children's toys, light bulbs are not designed to be used for heat.

Are being phased out by government order in some countries

- ✚ The excessive energy usage, as compared to compact fluorescent light bulbs and LED (light emitting diode) bulbs, has already led to some countries scheduling bans on the sales of incandescent bulbs in coming years.

How do I get the most from my CFLs?

- Do the twist. Screw in your CFL by holding the ballast (the white plastic part), NOT the glass tubing.
- You'll maximize the lifetime savings and effectiveness of your CFLs by keeping them on for 15 minutes or more at a time.
- Don't dim a non-dimmable. Only use bulbs labelled as dimmable on dimmer switches
- Check your controls. Most photocells, motion sensors and electric timers are not designed to work with CFLs. Always check with the manufacturer of the control for
- Give them air. CFLs are sensitive to extreme temperatures, so place your CFLs in open fixtures indoors. Using them in enclosed fixtures indoors can create a hot environment that reduces the lifetime of your bulbs. Note that covered reflectors are best used in recessed cans. Protect them outside. Protect bulbs from the elements by placing them inside enclosed fixtures outdoors. For colder climates, look at the packaging for optimal operating temperatures.

How Many Light bulbs Does it Take to Change the World? One..... And You're Looking At It.

Compact fluorescent light bulbs are often mentioned as one of the easiest ways to shrink your power bill and your carbon footprint. They present the quintessential green-green situation: saving money and helping the environment. What's not to like?

There's the higher retail price — who wants to pay three bucks for a light bulb when it's sitting right next to ones that cost less than a dollar? But the CFL can last up to **10 times longer** than incandescent bulbs, meaning you'd have to buy 10 of them during a single \$3 CFLs lifespan. Each CFL saves about \$30 during its tenure, according to the U.S. Energy Star program, and pays for itself in about six months.

One of the most potent threats to CFLs' superiority isn't their cost, but their contents. There's a small amount of toxic mercury in every one, which can be absorbed or inhaled, potentially causing brain damage in adults, children and especially in fetuses. Fumble a CFL while changing a light, critics warn, and you unleash a poisonous fiend in your home. Throw it out and you're dumping mercury in landfills.

Those are both valid concerns, if sometimes a bit overblown. You should be careful when cleaning up a broken CFL, but don't go nuts about it. Keep kids and pets away, open the windows and resist the urge to vacuum, since that can kick up mercury vapour into the air; see the EPA's advice on cleaning up broken fluorescent lights for a complete guide. When they do eventually burn out, make sure to dispose of them properly.

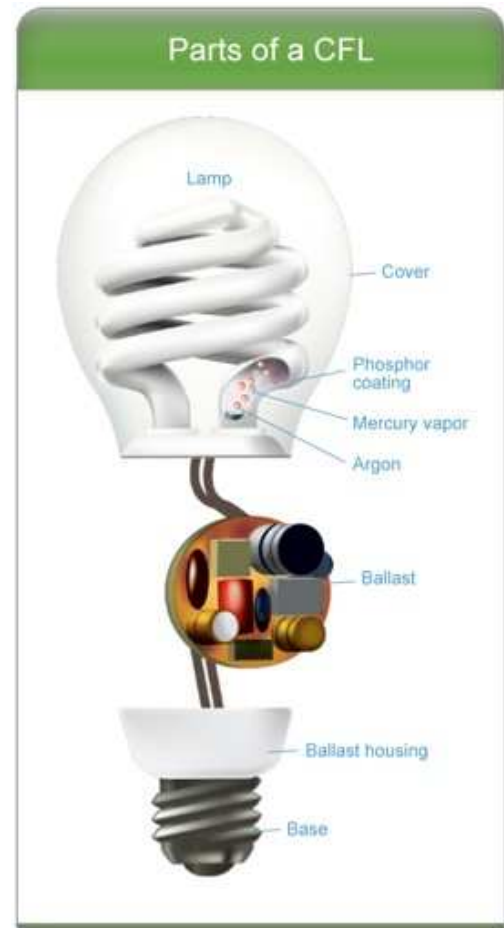
Why do CFLs contain mercury?

Fluorescent and incandescent lights generally work the same way: They zap certain types of atoms with energy until their electrons freak out and release photons of light. Incandescent bulbs do this by shooting electricity into a thin metal filament surrounded by inert gas and encased in a glass shell. Metal normally emits invisible infrared light when heated like this, but get the atoms worked up enough and they'll produce a visible glow, too.

Metallic atoms are also the light source in fluorescent lamps, but they use vaporized mercury instead of a solid filament. The incoming electrical current is carried through a glass tube, straight or coiled, that's filled with mercury vapour and argon gas. The electrified mercury atoms begin vibrating and releasing invisible ultraviolet light, which in turn excites a fluorescent phosphor coating on the inside of the tube, finally producing the visible light.

(It's this jittery relationship, combined with a jumpy magnetic ballast providing electricity, which gives fluorescent lights their infamous flicker. Electronic ballasts don't have this problem.)

Mercury is a crucial part of how all fluorescent bulbs work, and replacing it is a daunting task. Still, manufacturers have cut back on how much they use — CFLs' mercury content dropped by at least 20 percent from 2007 to 2008. While the bulbs contained an average of 4 milligrams a few years ago, many now use as little as 0.4 mg. By comparison, mercury thermometers contain about 500 mg of mercury, and older non-digital thermostats contain about 3,000 mg.



Does mercury overshadow CFLs' benefits?

Fluorescent lights only release mercury when their glass breaks. Consider how often you shatter a light bulb while changing it, and divide that number by 10 — since a single CFL requires about that many fewer replacements — and that's your risk of mercury exposure.

An incandescent bulb doesn't contain mercury, but it still has a higher overall mercury footprint than a CFL, thanks to the coiled tube's renowned energy efficiency. Coal-fired power plants are humans' No. 1 source of mercury pollution, and energy-intensive incandescent bulbs require those plants to burn more coal than CFLs do. That extra coal burning releases far more mercury than even the combined amount inside a CFL and in the coal emissions needed to light it.



While most fluorescent lamps finish their lives without shattering, however, it's another story once they're thrown out. They can easily break in trash cans, Dumpsters or en route to a landfill. It's only a small amount of mercury, but it adds up as more and more people are buying them, and it also endangers sanitation workers who don't know they're carrying bags containing mercury vapour. All the more reason to read up on the EPA's guidelines for properly disposing of fluorescent lights.

How much light or what is the equivalent?

There are three common CFL types available on the market:

- Warm white - 2700K
- Cool white - 4600K
- Cold white - 6400K

"Warm light 60" means that a CFL provides the same light as a 60-watt incandescent bulb.

Brightness is a description of light output, which is measured in lumens (**not watts**). Light bulb manufacturers include this information and the equivalent wattage on the packaging. To save energy, find the bulbs with the light output you need, and then choose the one with the lowest wattage. You can also look for a CFL that is labelled as the equivalent to the incandescent bulb you are replacing.

The colour of light may also affect how bright a light appears, even if the lumens are the same. Since most people are used to the soft yellowish glow from incandescent light bulbs, CFLs that produce light closer to the colour of daylight (colour temperatures above 3000K) may appear brighter because the colour of the light is less yellow.

How Much Light Do I Need?

Incandescent Bulbs (watts)	Minimum Light Output (lumens)	Common CFL (watts)
40	450	9 to 13
60	800	13 to 15
75	1,100	18 to 25
100	1,600	23 to 30
150	2,600	30 to 52

ENERGY SAVER LIGHT BULBS HOLD THE KEY TO ZESAS FORTUNE

A recent study in case of Zimbabwe states:

The country can save more than double the amount of electricity it exports to pay off the US\$50 million debt it owes Namibia for refurbishing its power generation plants at Hwange if consumers turned to energy-saving bulbs, the spokesman for ZESA Holdings, Fullard Gwasira has said.

More than **380 megawatts (MW)** would be saved monthly, minimising load shedding through the use of energy-savers (CFLs) that consume 80 percent less electricity as compared to what traditional bulbs and fluorescent tubes consume. The saving can adequately **light up four towns of Zimbabwe**. The power utility and NamPower of Namibia entered into an agreement for the refurbishment of Hwange Power Station (HPS) on a government-to government agreement in 2007, with NamPower undertaking to finance the phased rehabilitation exercise of the power station.

The agreement provided that ZESA would repay the debt through power exports of 150MW to Namibia until the loan is cleared. Gwasira could not, however, put a monetary cost to the amount of electricity exported. An electricity industry expert recently painted a gloomy picture of the deal, saying more could have been done to lessen the huge costs suffered by ZESA. The expert suggested the deal was flawed, explaining that by the time the refurbishment is completed, Zimbabwe would need to borrow again for further upkeep of the power generation units.

He suggested the amount of money could be used to import energy savers and still meet the required 150MW provided under the deal.

Now that some countries already banned the use of incandescent light bulbs in favour of CFL energy saver light bulbs even more development goes into perfecting alternative lighting.

You as the end user or consumer do not have to compromise by using CFLs as they already come in all imaginable shapes, colours, fittings and sizes. There is hardly any excuse left why not replacing your burnt out incandescent with a modern CFL energy saver light bulb or is there?

Join the ONE BILLION light bulb initiative and be part of a better world



<http://www.onebillionbulbs.com>