



Compact Fluorescent Cost-Benefit Analysis - Background

What is a Lumen, What is a Watt?

The amount of light given off is measured in **lumens**. One lumen is the equivalent of the light given off by one candle. A **watt**, on the other hand, is the amount of electricity a light bulb uses to produce light - it's not an indication of brightness. The distinction is important, because a new 14-watt compact fluorescent light bulb produces as much light - as many lumens - as a traditional 60-watt incandescent bulb. As much light, using only one-quarter of the electrical energy!

Incandescent light bulbs are the traditional light bulbs. Thomas Edison invented the incandescent light bulb nearly 120 years ago, and it still works pretty much as it did then. Inside a glass bulb, electricity heats up a wire filament, causing it to glow and give off light. Of course, electrical heaters work in much the same way, and that's why more than 90 percent of the energy produced by incandescent lights is heat, not light. As a result, incandescent light bulbs are inefficient light sources. Regular incandescent bulbs last usually between 750 to 1,000 hours before burning out.

Halogens are more efficient, modern versions of Edison's incandescent bulb and they last longer - 2,250 to 3,500 hours. They give off a crisp, very bright, white light, and they maintain their light output over time without fading with age, as an incandescent does. As a result, most automobile headlights are halogen now.

While standard halogens are efficient, most people use much more wasteful high-wattage halogen tubes in their homes. These floor lamps throw great amounts of light onto the ceiling, using either a 300- or a 500-watt halogen tube. Unfortunately, these cheap and convenient halogen tubes waste energy by creating four times more heat than the average incandescent bulb. A 500-watt halogen reaches temperatures of over 1,200 degrees - creating a serious fire hazard.

Fluorescent lights are phosphor-coated glass tubes filled with an inert gas and a small amount of mercury. Because different brands can have different mixes of gases inside, fluorescents produce a wide spectrum of light that match the warm glow of an incandescent. All fluorescent lights need a controlling ballast to operate. The ballast alters the electric current flowing through the fluorescent tube, activating the gas inside and causing it to glow. Newly developed electronic ballasts eliminate that annoying flicker and buzz that used to occur with old magnetic ballasts, which were also heavier and less efficient. But there are now even more impressive improvements to the design of fluorescent lights.

A variation on the fluorescent tube, the **compact fluorescent light bulb (CFL)** works the same way, only the tube has been made smaller and folded over in a way to make them fit into spaces designed for incandescent bulbs. With a screw base that fits a normal light bulb socket. CFLs provide high-quality light, smart technology, and design, requiring less energy while lasting longer than typical incandescent bulbs. ENERGY STAR qualified CFLs use 66% less energy than a standard incandescent bulb and last up to 10 times longer.

A compact fluorescent lamp will initially cost more than an incandescent bulb, but, because it lasts longer and costs so much less to operate, it will prove to be a better bargain over time. Just keep in mind that light bulbs cost much more to run than to buy in the first place.

ENERGY STAR qualified CFLs operate at less than 100°F, they are safer than typical incandescent bulbs, which heat to high temperatures according to their wattage and halogen bulbs, which heat to 1,200°F. Due to their high heat output, incandescent and halogens can cause burns and fires. CFLs are cool to the touch. In the lighting world, heat output equals energy waste.

A **cost-benefit analysis** is a relatively simple and widely used technique for deciding whether to make a change. As its name suggests, to use the technique simply add up the value of the benefits of a course of action, and subtract the costs associated with it. Costs are either one time, or may be ongoing. Benefits are most often received over time. We build this effect of time into our analysis by calculating a **payback period**. This is the time it takes for the benefits of a change to repay its costs.

CFLs add up to big energy savings; Facts

- If every household in the U.S. replaced one light bulb with an ENERGY STAR qualified compact fluorescent light bulb (CFL), it would prevent enough pollution to equal removing one million cars from the road. (www.energystar.gov)
- If every American home changed out just 5 high-use light bulbs with ones that have earned the ENERGY STAR, each family would save more than \$60 every year in energy costs, and together we'd keep more than one trillion pounds of greenhouse gases out of our air – equal to the emissions of 8 million cars. That's a \$6 billion energy savings for Americans, equivalent to the annual output of more than 21 power plants. (www.energystar.gov)

