The Compact Fluorescent Lamps

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This article presents information on the compact fluorescent lamp (CFL), also known as an energy saving light, or less commonly as a compact fluorescent tube (CFT).

Compared to general service incandescent lamps giving the same amount of visible light, CFLs generally use less power; have a longer rated life, but a higher purchase price. In the United States, a CFL can save over US $30 in electricity costs over the lamp's life time compared to an incandescent lamp and saves 2,000 times its own weight in greenhouse gases [1]. Like all fluorescent lamps, CFLs contain mercury, which complicates their disposal.

The parent to the modern fluorescent lamp was invented in the late 1890s by Peter Cooper Hewitt [2]. This type of lamps were used for photographic studios and industries [3].

Construction. The most important technical advance has been the replacement of electromagnetic ballasts with electronic ones; this has removed most of the flickering and slow starting traditionally associated with fluorescent lighting. There are two types of CFLs: integrated and non-integrated lamps.

Parts. There are two main parts in a CFL: the gas-filled tube (also called bulb or burner) and the magnetic or electronic ballast. The electrical current from the ballast flows through the gas, causing it to emit ultraviolet light. The ultraviolet light then excites a phosphor coating on the inside part of the tube. This coating emits visible light.

CFL power sources. CFLs are produced for both alternating current (AC) and direct current (DC) input. DC CFLs are popular for use in recreational vehicles and off-the-grid housing. Some families in developing countries are using DC CFLs (with car batteries and small solar panels) and/or wind generators, to replace kerosene lanterns.

Lifespan. The average rated life of a CFL is between 8 and 15 times that of incandescent. CFLs typically have a rated lifespan

of between 6,000 and 15,000 hours, whereas incandescent lamps are usually manufactured to have a lifespan of 750 hours or 1,000 hours. Some incandescent bulbs with long rated lifespans of 20,000 hours have reduced light output.

Energy efficiency. For a given light output, CFLs use between one fifth and one third of the power of equivalent incandescent lamps. Since lighting accounted for approximately 9% of household electricity usage in the United States in 2001, widespread use of CFLs could save as much as 7% of total US household usage.

If indoor incandescent lamps are replaced by CFLs, the heat produced by the building's lighting system will be reduced. At times when the building requires both heating and lighting, the building's central heating system will then supply the heat. If the building requires both illumination and cooling, then CFLs will use less electricity themselves and will also reduce the load on the cooling system compared to incandescent lamps. This results in two concurrent savings in electrical power.

Starting time. Incandescents give light almost immediately upon the application of voltage. CFLs take a perceptible time to achieve full brightness, and can take much longer in very cold temperatures. Certain styles of lamp using a mercury amalgam can take up to three minutes to reach full output. Coupling this with the shorter life of CFLs when turned on and off for short amounts of time may make incandescent bulbs more attractive for applications such as outdoor or motion-activated lighting, until solid-state lighting becomes cost-effective.

Bibliography:

1. Compact Fluorescent Light Bulbs, Energy Star. http://www.energystar.gov/index.cfm?c=cfls.pr_cfls. Retrieved on 2007-12-24.
2. Masamitsu Emily, (May 2007), The Best Compact Fluorescent Light Bulbs: PM Lab Test, Popular Mechanics, http://www.popularmechanics.com/home_journal/home_improvement/4215199.html, retrieved on 2007-05-15
3. Mary Bellis (2007), "The History of Fluorescent Lights", About. com, http://inventors.about.com/library/inventors/bl_fluorescent.htm, retrieved on 2008-02-13