



# Lighting

Save money by using energy efficient lighting technologies

One of the simplest and most cost-effective ways to save money on your electric bill is through energy-efficient lighting. Lighting typically accounts for 20% or more of a commercial facilities' energy consumption. Replacing aged lighting components with advanced energy-efficient components can save as much as 50% of a facilities' lighting energy costs, or about 10% of the energy bill. In addition to energy savings, other benefits that result from a lighting retrofit include improved light quality, a reduction in lighting system maintenance costs, occupant satisfaction and improved worker productivity. Most lighting retrofits pay for themselves through energy savings in less than three years.

## Compact Fluorescent Lamps

### *Time to Replace the Old Light Bulb*

Incandescent bulbs have been around since the early 1900's, and frankly, they are not energy efficient. Most of the electricity (approximately 90%) used by the standard incandescent bulbs result in heat, not light. Fluorescent lighting, on the other hand, generates less heat and boasts a lumen/watt factor that is three to four times more efficient than incandescent lighting. Compact Fluorescent Lamps (CFL's) use 75% less energy than typical incandescent bulbs and will fit in most of the same fixtures. Generally, CFL's last eight to ten times longer than a standard bulb, depending on ballast temperature, burn hours, and on & off cycle frequency.



CFL's are significantly more expensive to purchase than standard incandescent bulbs. However, there is a strong justification: Replacing ten (10) - 75 watt incandescent bulbs with 20 watt CFL's (costing \$15 each), used 40 hours per week, amounts to a savings of 1,144 kWh/Year or \$286/Year at \$0.25 per kWh. And, the CFL life cycle will be approximately ten times longer. So that eliminates ten incandescent lamp replacements. Some commercial facilities estimate the labor to replace a lamp at \$3 per lamp; this is an additional savings of \$300 (10 lamps replaced 10 times over the life of the CFL 10,000 hrs or approximately 5 years) plus \$75 (ten replacement lamps 10 times at \$0.75 each) a total of \$375. Therefore, the investment of \$156.24 will payback in approximately 5 months. The total life cycle cost savings: \$286 annual energy savings X 5 years + \$375 Avoided lamp replacement and labor = **\$1,805!** For you accountants that is an ROI (return on investment) of 11.5. Yes, that does mean it's economically worthwhile to replace brand new lamps. Don't wait until they burn out! Additionally, 20 incandescents replaced with CFL's will reduce lamp heat output by an approximate equivalent to a 1,000 watt space heater!

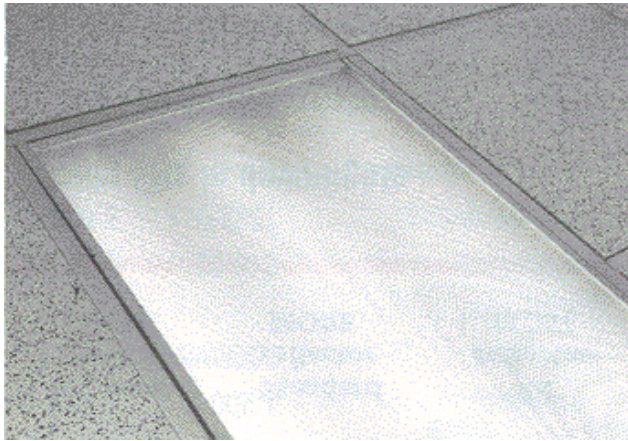
CFL's are available as either dedicated or screwbase products. Dedicated CFL products, like linear fluorescent lamp systems, use a ballast that is hard-wired to lamp holders within a luminaire. Because the lamps fit into specially keyed sockets, only dedicated CFL lamps can be used. Screwbase self-ballasted CFL's contain a lamp and ballast as a single unit. Self-ballasted CFL's have either bare or encapsulated lamps. Encapsulated lamps have a permanently attached glass or plastic cover, which is available in globe or capsule shape. There are a variety of CFL's available today that will work for most existing fixtures. Contact one of Kaua'i Island Utility Cooperative's participating lighting experts for assistance in choosing the best CFL for your applications.

## Fluorescent T8 Lamps with Electronic Ballasts

Another important advance in fluorescent technology is the development of the T8 lamp. Featuring a tube of only one inch in diameter – compared with one and a half inches for the traditional T12 lamps. A 32-Watt T8 lamp, for example, uses 20 percent less energy to provide the same light output as a 40 watt T12 lamp. The smaller diameter allows the manufacturer to use more expensive rare earth phosphors, which results in improved light output with less power input. T8 lamps provide optimum system efficiency when used with electronic ballasts.



*T-8 and electronic ballast*



*Three lamp fluorescent fixture*

A ballast provides proper starting and running voltage and current for the lamps. The typical facility with an old fluorescent lighting system will have T12 lamps run by standard/magnetic ballasts. To achieve the highest efficiency, electronic ballasts should be used in conjunction with T8 lamps. Electronic ballasts differ from magnetic ballasts in physical construction and operational characteristics. They use electronic components to regulate the power to the lamp. Electronic ballasts receive incoming power at 60 hertz, and then convert it to a high frequency, usually about 20 to 40 kilohertz.

The higher frequency allows for a higher operating efficiency, and thus energy savings. Other advantages of electronic ballasts include lighter weight, no lamp flicker, and no ballast hum. When converting a standard magnetic ballast lighting system to an electronic ballast system, you'll realize the added benefit of a reduced heat load on your air conditioning system. This means your air conditioning system doesn't need to work as hard to keep your spaces cool.

## Fluorescent Lighting Myth

Fluorescent fixtures do not take “more energy to start than they do to run”. On and Off switching have only a small effect on energy consumption as well as lamp life. So, turn those lights off when not in use or install an occupancy sensor (\$50-\$75) in place of the wall switch. Rely on a simple automatic control to give you energy savings. You won't have wasted lighting costs and you won't have to remind people to turn the lights out when they leave.

