Energy-efficient lighting

Here's an amazing energy fact: only about 10 percent of the energy used by an incandescent light bulb goes toward producing light. The rest of the energy is wasted as heat. Energy-efficient light bulbs, on the other hand, produce more light than heat. As a result, they provide the same amount of light as incandescent bulbs but use much less energy. Because lighting can account for up to 20 percent of a home's electricity use, switching to more efficient bulbs provides a big opportunity for saving money.

Reduced-wattage and long-life incandescent light bulbs are widely available. They may last longer than a standard incandescent bulb, but they typically produce less light and are not always more energy-efficient.

Halogen bulbs are a type of incandescent bulb that contains an inert gas. They are more energy-efficient than incandescent bulbs and provide a brighter white light that does not dim with age. They operate at a higher temperature than incandescent bulbs and the tubular type (often used in torchiere lamps) can cause fires if it comes in contact with combustible materials. These bulbs last 2,000 to 4,000 hours.

High-intensity discharge (HID) bulbs include metal halide, mercury vapor, and high- and low-pressure sodium. They are more energy-efficient than halogen bulbs and can last up to 20,000 hours. They are mainly used in commercial and industrial buildings with high ceilings and for outdoor lighting.

Compact fluorescent light bulbs (CFLs)

CFLs use the same technology as the long, fluorescent white tube lights you're used to seeing in offices and schools. Manufacturers developed ways to apply the energy benefits of fluorescent lighting to products that fit into conventional light sockets; hence the name, compact fluorescents.

These bulbs use 75 percent less energy than incandescent bulbs to produce the same amount of light. That means you can select a bulb with a much smaller wattage requirement to get the light you need.

CFLs also last up to 10 times longer than incandescent bulbs (10,000 hours compared to 1,000 hours). Some types of compact fluorescents need a few minutes to reach full power after they're turned on. CFLs are available in warm, cool and natural daylight colors. Most of today's CFLs (and tubular fluorescents) use electronic ballasts that eliminate the humming noise and flicker associated with older fluorescent lights.

Equivalence in light output from fluorescent to incandescent light bulbs

A 13- to 16-watt compact fluorescent =
a 60-watt incandescent (about 900 lumens)

A 20-watt compact fluorescent =
a 75-watt incandescent (about 1,100 lumens)

A 23- to 28-watt compact fluorescent =
a 100-watt incandescent (about 1,750 lumens)

A 39-watt compact fluorescent =
a 150-watt incandescent (about 2,800 lumens)

Advice for using CFLs

Compact fluorescents might not be appropriate for all home lighting needs. For example, a CFL works most efficiently when it is left on for at least 15 minutes. Look at the CFL packaging to find those compatible with three-way fixtures and dimmer switches. There are also CFLs made for outdoor light fixtures. There are simple rules of thumb for selecting a CFL for maximum energy efficiency:

- Use compact fluorescents in light fixtures and lamps that remain on for more than 15 minutes.

- Use them in hard-to-reach fixtures to save yourself some precarious trips up a ladder.
- Use CFLs developed specifically for outdoor or cold spaces.
- Use CFLs developed to be used with three-way light fixtures.
- Use CFLs developed to be used with dimmer light switches.
- Do not use CFLs in fixtures and lamps that are frequently turned on and off.

Compact fluorescents are commonly available for $2 to $5 each, and often less per bulb in bulk packaging (specialty CFLs typically cost more). Although their purchase price is higher than incandescent bulbs, CFLs cost less over their lifetime because of significantly reduced energy use.

CFL purchase and disposal

Most hardware and home improvement stores carry CFLs, but you can also check the Yellow Pages under "lighting" or call your electric utility. CFLs are designed to screw into standard sockets and come in a variety of shapes and sizes. Select models that will work with your light fixtures.

When CFLs finally wear out, don't throw them away with your regular garbage because they contain small amounts of mercury. Some communities sponsor household hazardous waste collection days to ensure the proper recycling or disposal of items such as these. Contact your city's public works department or local home improvement store to find out about options in your area. Home improvement stores that carry CFL bulbs often provide drop-off recycling bins.

If you break a fluorescent bulb, there are EPA-approved steps for cleaning up.

Before cleanup

- Have people and pets leave the room.
- Air out the room for 5 to 10 minutes by opening a window or door to the outdoors.
- Do not touch or handle mercury drops with your bare hands.
- Shut off central forced-air heating or air-conditioning systems.
- Collect materials needed to clean up a broken bulb: stiff paper or cardboard; sticky tape to pick up visible mercury particles; damp paper towels or disposable wet wipes (for hard surfaces); and a glass jar with a metal lid or a sealable plastic bag.

During cleanup

- Be thorough in collecting broken glass and visible powder and mercury.
- Do not vacuum mercury particles.
- Place cleanup materials in a sealable container.

After cleanup

- Promptly place all bulb debris and cleanup materials outdoors in a trash container or protected area until materials can be disposed of properly. Avoid leaving any bulb fragments or cleanup materials indoors.
- If practical, continue to air out the room where the bulb was broken and leave the heating or air-conditioning system shut off for several hours.
- Avoid inhaling the mercury during the cleanup process.

Light-emitting diodes (LEDs)

You have seen them in exit signs, traffic signals, holiday lights and as the colored power button on your television or computer. They are now available for use in your home's lighting fixtures. This solid-state technology is even more energy-efficient than CFLs. They produce little heat and maintain their light intensity for up to 25,000 hours (afterward dimming to about 70 percent of their capacity). LEDs can be used as regular fixture bulbs, floodlights and dimmable globes. They provide directional light and are ideal for recessed downlights and task lighting. LED bulbs are relatively new, so they are still fairly expensive. If you decide to try one, look for the EPA Energy Star label to ensure quality and performance.

Lighting labels

To help make your light bulb purchasing decisions easier, new labels are now required on all products. Manufacturers must clearly show a bulb's light output (measured in lumens), how much energy it requires (measured in watts), and how many hours it's expected to last. Note that a bulb's light output per wattage varies somewhat from brand to brand.

Photo credit: Department of Energy/NREL

There is an increasing variety in energy-efficient lighting available to homeowners.

When shopping for an energy-saving fluorescent bulb, don't choose it by wattage, but instead look for bulbs with a high lumens-to-watts ratio. For example, a 75-watt incandescent bulb produces about 1,200 lumens, for a lumens-to-watts ratio of 16:1. You get nearly the same light output with an energy-saving 18-watt fluorescent bulb that has a lumens-to-watts ratio of 61:1. To calculate the ratio, divide the number of lumens printed on the package by the bulb's wattage.

Lighting tips

No matter what type of light bulbs you choose, you'll be guaranteed to save energy if you follow these common-sense practices:

- Turn lights off when you're not using them.
- Take advantage of natural light from windows whenever possible.
- Do not use more light than you need.
- Focus the light where it is needed most.
- Regularly dust your light bulbs and fixtures to prevent buildup.
- If you normally leave outdoor lights on all night, install a motion sensor or a daylight sensor or photocell.
- "De-lamp" (remove bulbs or tubes) from fixtures if not needed.

Additional information

See MU Extension guide GH5003, Switch Home Lighting for Energy Savings, at *http://extension.missouri.edu/p/GH5003* to learn more about how efficient home lighting can reduce energy use and utility bills.

Photo credit: Department of Energy/NREL

CFLs come in many shapes and sizes. Their upfront cost is slightly higher than other bulbs, but they will reduce your utility bill.

Energy Independence and Security Act (EISA) of 2007

The EISA is an energy policy that addresses energy-efficiency standards for light bulbs. The first phase requires any screw-based bulb that uses between 40 and 100 watts use at least 27 percent less energy by 2014. The second phase requires that most light bulbs be 60 to 70 percent more energy-efficient than today's standard incandescent by the year 2020.

Notes

Original work created by Montana State University Extension and the University of Wyoming.
Adapted with permission by University of Missouri Extension.

UNIVERSITY OF MISSOURI Extension

■ Issued in furtherance of the Cooperative Extension Work Acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. Director, Cooperative Extension, University of Missouri, Columbia, MO 65211 ■ an equal opportunity/ADA institution ■ 573-882-7216 ■ extension.missouri.edu