ENERGY SERVICES

HOLIDAY LIGHTS FACT SHEET

2014

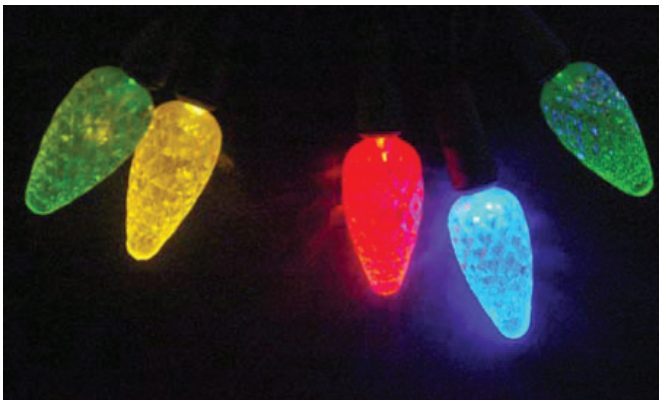
HOLIDAY LIGHTS: LED AND FIBER OPTICS

Decorating with holiday lights has become a year-round activity—one that costs consumers more every year as energy rates climb and decoration items become more diverse and elaborate. LED lighting is increasingly popular and the selection of LED products grows each year, but there are still plenty of incandescent lamps – from minis to large C9 lamps – on the market.

LED LIGHTS

Light-emitting diode (LED) lights and fiber optic trees are two energy-efficient technologies that can reduce your energy costs substantially and increase holiday safety at the same time. Residential and commercial products are available, and the ENERGY STAR® program now has specifications for decorative light strings. Products must meet stringent efficiency, quality and packaging requirements so that consumers have a clear understanding of what they are getting when they buy the light strings.

- Input power per lamp cannot exceed 0.2 watts.
- Products must pass a 1,000-hour continuous life test.
- Warranty against defects through all normal residential seasonal use must be at least three years.
- The average number of failed lamps after 1,000 hours of operation must be no greater than 3 percent.
- Products labeled for outdoor use must pass weather tests, including exposure to ultraviolet emissions, water spray and condensation.
- Light strings must meet appropriate safety standards and have protection against over-voltage.
- The average maintained light output for colored lamp strings must be no less than 70 percent. For strings with white lamps or any phosphor-based lamps, the average must be no less than 50 percent. There are now more than 70 brands of decorative lighting strings that qualify for the ENERGY STAR rating. Look for the designation on the packaging.



BRIGHTER AND MORE COLOR CHOICES

LED holiday lights have gotten brighter, and now come in more colors, shapes and items than ever before. LEDs offer a number of benefits over conventional lighting:

- **Energy efficient**—0.08 watts per LED C7 multicolor bulb (compared with 0.48 watts for an incandescent mini-light and 6.0 watts for a standard incandescent C7 bulb).
- **Long lifespan**—LEDs may last thousands of hours longer than incandescent lamps. They lose brightness over time, however, and lifespan claims may be based on when the manufacturer decides they are no longer useful. ENERGY STAR-rated products must prove light level maintenance at 70 percent by end of life. 25,000 hours is the published lifespan for some of those products.

- **Safety**—LEDs cannot cause combustion by contact with the bulbs since they are cool to the touch no matter how long they are left on.
- **Sturdy bulbs**—The epoxy lenses are virtually indestructible. This alone greatly improves lamp life.

Different in appearance than familiar incandescent models, LEDs seem to shimmer with movement as the light passes through the faceted bulbs. Colors are bright and stay that way because the colors are incorporated into the light itself, not just painted onto the bulb.

LED lights can be used for beautiful and affordable holiday decorating. Manufacturers estimate that traditional incandescent light sets are replaced every one to two years, so while they may be less expensive to purchase than LEDs, frequent replacement costs quickly add up. Many municipalities have switched to LEDs to take advantage of energy savings and durability.

CHOICES ARE GROWING

LED lights are available in strings from 25 to 150 bulbs, with red, green, blue, white, yellow and multicolored bulbs. Strings with lamps that change color are also available, as are different styles, including mini-ice, berry, ball and candle shapes in multiple sizes. In addition to traditional light strings, there are icicle-style lamps, rope lights, holiday ornaments and pre-lit artificial Christmas trees. Amber or orange Halloween lights and patriotic red, white and blue sets are available.

Photo courtesy of Kellogg Plastics.

COSTS VARY BY COLOR

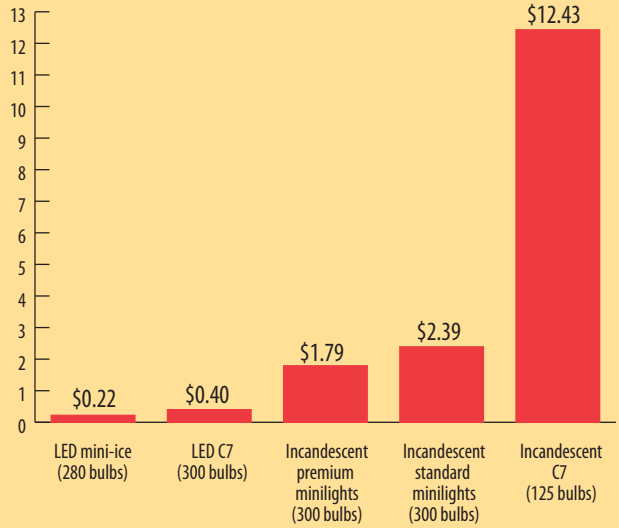
Costs may vary by color because, unlike painted bulbs, the chemical makeup of the LED bulb determines its color and prices of materials vary. White and blue bulbs tend to be the most costly to produce.

Multi-color strings that include more white and blue bulbs often cost more than sets without those colors.

CONVERT OLD LIGHT STRINGS

You can convert conventional strings of lights to LEDs as long as the wattage of the bulb is the same, though simply getting new LED strings is cheaper. Most LED strings do not have replaceable lamps because different colors require different amounts of power. Also, replacing lamps breaks the seal between the bulb and the wire; water ingress is better controlled with sealed connections.

FIGURE 1
ENERGY COST* OF COMPARABLE OPTIONS



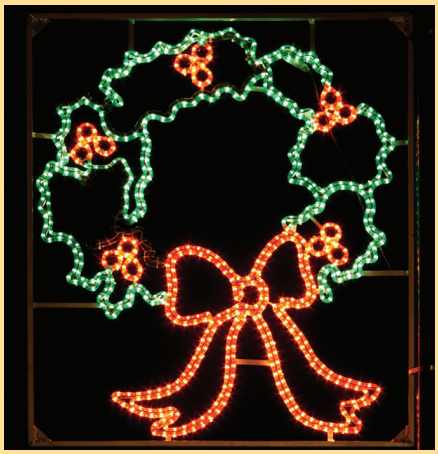
*Assuming:

- An 8-foot tree lighted for one season (five hours per day for 30 days).
- Fewer standard incandescent bulbs in the display, because they are much brighter than LED bulbs.
- Wattages: LED mini-ice 280 bulbs = 13 watts;
  LED C7 multicolor 300 bulbs = 24 watts;
  incandescent premium (energy-saving) 300 mini-lights = 108 watts;
  incandescent standard 300 mini-lights = 144 watts;
  incandescent C7 125 bulbs = 750 watts (6 watts per bulb).
- Energy cost calculated at 11.05 cents per kWh (average residential rate in Western's territory).

Strings with commercial-quality plugs allow dozens of strings to be connected to one plug. Some products for trucks, cars, boats and RVs are battery powered or solar powered, although these may not charge sufficiently during the dark time of the year.

ENERGY USE

Many manufacturers do not publish the energy requirements of their products. When contrasting two comparable 7.5-foot trees, the one lit with 500 incandescent lamps used 210 watts while the one lit with 900 LED lamps used less than 11 watts. Because the LEDs produce less light, using about twice as many lamps usually results in similar brightness.

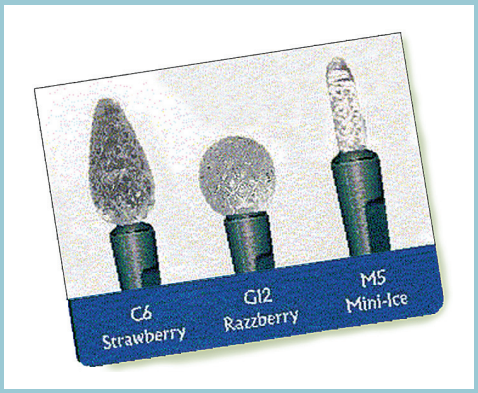


During the holiday, many people love to decorate with strings of lights, most of which are standard incandescent C7 lights or mini-lights. LED lights and fiber optic trees are two technologies that could save you energy—and money!

FIBER OPTIC ARTIFICIAL TREES

Another energy-efficient decorating strategy is the fiber optic-lit artificial tree and similar decorations.

The first fiber optic trees used a single incandescent halogen bulb ranging from 5 to 50 watts depending on the size of the tree, so there was only one bulb to replace. The bulb transmitted light through hundreds of very small fibers along each branch of the tree. Some trees had a rotating color wheel in the base that changed the color the fibers emitted. The lamps were hot and could be a hazard, though the tree and fiber light tubes remained cool.

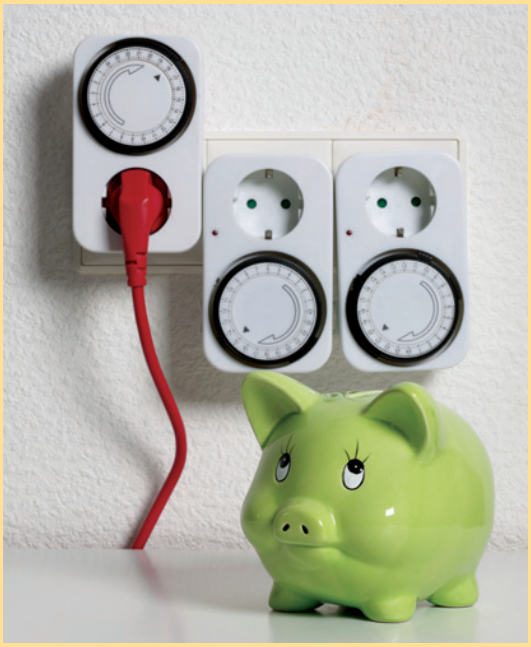


LED technology has updated the fiber optic tree, eliminating the hot halogen lamp and the need for a motor to create the color-changing effects. Energy use can be less than 20 watts for a large tree. In addition to the fiber optic lights, you can decorate the tree with individual LED lights or ornaments.

A NOTE ABOUT WIRING SAFETY

Wiring is a weak link in any system. Improperly attaching light sets with staples, winding wires around nails and other practices can damage wiring. So can prolonged exposure to sunlight, which is why holiday light sets are labeled for 90 day per year use. Treat the wiring with care to increase safety and extend the life of any light set – the wiring is more likely to fail before the lights do.

Before putting up your lights, test the system and inspect the wires for defects. Many manufacturers now include a warning on their packaging regarding lead in the wire coatings. The coatings are the same on all wiring, although light sets in the past often did not include the warning. To avoid unnecessary exposure to lead, wash your hands after handling light sets.



Timers that reliably turn off lights during daylight hours and other times can further reduce energy costs.

MORE HOLIDAY LIGHTING INFORMATION

LED light strings are widely available at home improvement, hardware and general merchandise stores. Visit Energy Star at **www.energystar.gov** to find certified decorative lights.

Online resources provide additional options. Narrow your search by including "ENERGY STAR" in your search terms. If seeking commercial products, search specifically for them. Twelve-volt products for RVs, trucks and boats are also available.

ENERGY SERVICES
Western Area Power Administration

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