

Lighting: Exit Signs

Looking for a quick way to reduce energy and maintenance bills? Exit signs that must be lit 24 hours a day, 7 days a week can take a bite out of commercial and industrial budgets, but today's more efficient exit signs can offer lifetime savings of up to \$300 per sign in reduced energy, materials, and labor costs as compared with standard incandescent models.

What Are the Options?

Incandescent lamps. In traditional exit signs, two incandescent lamps typically light the sign. They draw 24 to 40 watts of power (**Table 1**), so depending on local prices, a single exit sign can run up electricity bills of more than \$30 per year. More importantly, exit signs are required to be on all the time and therefore the lamps burn out in a matter of months. The cost of replacement lamps and the labor to install them can add up to \$24 per year per sign, not to mention increasing the risk of having a sign out of order at the wrong time.

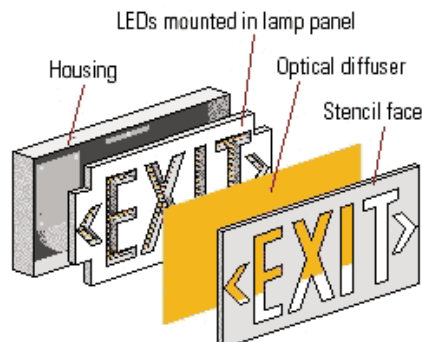
Table 1: Comparison of exit sign alternatives

Light source	Wattage	Life
Incandescent lamp	24 to 40	2 to 8 months
LEDs	<1 to 5	10+ years
CFLs	10 to 24	1 to 2 years
Electroluminescent panels	<1	10+ years
Photoluminescent materials	0	10+ years
Cold cathode	5	10 years

Source: E SOURCE

Today, the most cost-effective alternatives are the newest **light-emitting diode (LED)** exit signs (**Figure 1**). They use only 1 to 5 watts of power per surface and cost less than \$5 per year to operate, depending on the model and local utility costs. Because LEDs also last considerably longer than incandescent lamps, lifecycle savings are dramatic. Over a 10-year period, first costs, energy expenditures, and maintenance requirements for an incandescent sign could run about \$570, depending on local conditions, whereas a comparable LED unit with a 10-year life would incur overall costs of about \$125.

Figure 1: Stencil-faced exit sign with diffuser



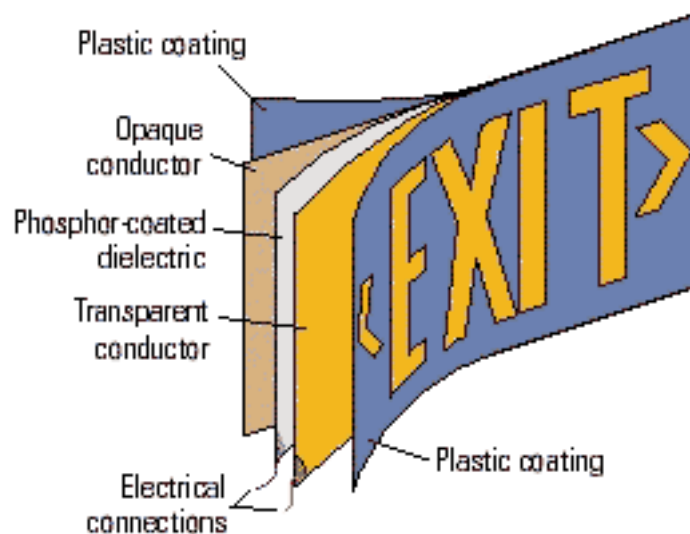
Source: E SOURCE

When LED signs were introduced, high first costs limited them to a few niche applications. In 1994, an LED unit cost roughly five times as much as an incandescent model, but that gap has narrowed—and in some cases vanished altogether. For example, there is no longer a price difference for commodity-grade signs with battery backup.

Compact fluorescent lamps (CFLs). Just a few years ago, CFL exit signs were the leading alternative to standard incandescent models, but they have all but disappeared from the market. The CFLs simply could not compete with LEDs in performance and lifecycle costs.

Electroluminescent panels. These panels (**Figure 2**) feature phosphors that light up when voltage is applied. Although the panels produce a uniform light and consume very little power, some products are costly and suffer high rates of lumen depreciation.

Figure 2: Construction of an electroluminescent panel



Source: Lithonia Lighting

Cold cathode fluorescents. Cold cathode lamps are a relative newcomer to the exit-sign scene, but this type of light source has been used for years in laptop computers. The tubes are thin (T1 lamps, or 1/8 inch in diameter) and they last a long time because they have no filaments. New shock-absorbing techniques have made the fragile lamps suitable for a larger range of applications, and their small size and uniform light output make them a good choice for exit signs. However, the technology offers a lower efficacy than conventional fluorescent lamps and is therefore not used for general lighting applications at present.

Photoluminescent materials. Some exit-sign manufacturers use photoluminescent materials that absorb and reradiate light. These signs do not require electrical power, but they need to be charged by light sources in their surrounding area. Improvements in the technology have led to recent acceptance by the National Fire Protection Code and recent UL approvals for some photoluminescent products. These products must maintain particular levels of visibility for at least 90 minutes after other sources of light have been extinguished.

How to Make the Best Choice

Select an Energy Star-certified product. Through the Energy Star program, the U.S. government has developed specifications for cost-effective, energy-efficient exit signs. A sign may carry the Energy Star label if it:

- consumes less than 5 watts of power per face,
- exceeds the National Fire Protection Association Safety Code 101 guidelines, and
- carries at least a five-year manufacturer warranty for defective parts.

Manufacturers test their products against these guidelines, and the Energy Star Web site lists all qualifying products. You'll find that most of the qualifying signs are made with LEDs. New Energy Star specifications—version 3.0—are in the works as of late 2003 and are planned for implementation starting August 1, 2004. The new specs, if adopted as they now stand, would allow self-illuminating signs such as those that use photoluminescent materials.

If you just pick something off the Energy Star list, you'll be making a good choice. To hone in on the most cost-effective option for your application, you can make use of the spreadsheet that's also available at the Energy Star Web site. First, select the products that meet your non-energy-related requirements, such as number of faces, battery backup, and so on. Next, contact the manufacturers to get the latest prices. Enter that price information in the spreadsheet to learn which product will deliver the best overall savings at the lowest cost.

Pick products that use the newest LED technology. Not all LED products offer equal performance. Exit signs using the newest LED technology start out brighter and maintain their brightness longer than those using older technologies. For red exit signs, look for products that use aluminum, indium, gallium, and phosphorus LEDs, referred to in the trade as AlInGaP.

Don't be fooled by long warranties. LEDs rarely burn out, but their brightness does fade over time, depending on the materials they are made of and the temperatures and humidity they are subjected to. In some applications, the brightness of a sign may diminish in just a few years to the point that it no longer meets code. Even so, in the past, many manufacturers offered long warranties on their products—in some cases for 25 years or more. Buyers often purchased the products with the expectation that they would last for the life of the building without any maintenance.

Although the newest LED products are expected to last longer than earlier signs, reputable manufacturers are now offering shorter warranties. Lithonia, for example, which uses the longest-lived LEDs available, backs up many of its products with a 5-year warranty. Lithonia believes the LEDs will last longer than that, but given that no 25-year tests have been conducted, the company did not want to mislead buyers.

Are green LED signs a viable choice? Green signs are preferred (or required) in some areas, but they are not permitted in Canada. (In Canada, standard CSA 860 covers the size, shape, and intensity of exit signs.) Early green LED products provided lower light

output than red LED signs, but new technology has created a green LED that is both bright and efficient. This technology is now available in products made by such companies as Gilbert Industries and Lithonia.

What's on the Horizon?

LED exit signs will likely continue to be the most cost-effective, energy-efficient option so long as prices keep falling and performance is improved. LEDs with efficacies greater than those of CFLs have already been tested in the laboratory. The growing use of LED technology in other applications (such as traffic lights and outdoor signage) should accelerate the introduction of new products in the exit sign arena as well. Research continues to produce improvements in photoluminescent and electroluminescent technologies as well.