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> Lighting the Case

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LED lighting has become an accepted alternative to fluorescent lighting in refrigerated and freezer cases, but is LED really better than fiber optics?



Refrigerated and freezer cases account for nearly half of a supermarket's annual electricity costs, according to the Lighting Research Center (LRC) at Rensselaer Polytechnic Institute, Troy, N.Y. Meanwhile, the lighting used to illuminate those cases figures in one-quarter of those costs ♦ or one out of every eight dollars spent on energy in a store.



LED-lit cases at a Tengelmann store in Germany.

In other words, case lighting is a pretty significant energy factor in any supermarket. Fortunately, advancements in lighting technology over the past few years are producing major energy-saving opportunities and merchandising benefits for food retailers.

In 2006, the LRC conducted a study in a Price Chopper supermarket in Rotterdam, N.Y., that compared fluorescent lighting ♦ the standard used by nearly all commercial refrigerators and freezers for illumination ♦ to a promising alternative, LED (light-emitting diode) lighting. The study found that shoppers ♦ overwhelmingly ♦ preferred LED lighting inside freezer cases when it comes to ♦ merchandise appeal and the brightness, comfort and evenness ♦ of the lighting, according to a 2007 report by the LRC.

Since then, Price Chopper, a 119-store chain based in Schenectady, N.Y., has made a commitment to using

LED lighting in all new frozen and refrigerated cases with doors, including dairy cases, said Benny Smith, vice president of facilities, who oversees store, warehouse and office maintenance and energy programs for the chain.

◆ The study was a little ahead of its time, but once the market caught up, and case manufacturers made LED available, we jumped on board, ◆ Smith said. Price Chopper now has LED-lit cases in 15 to 20 stores, he added. Most of the installations are brand new cases that have replaced eight- or nine-year-old units that used fluorescent lighting. In a few instances, the chain has retrofitted moderately old cases with LED lights rather than replacing them.

◆ Our primary goal is to convert to LED if the situation and location works out, ◆ said Smith, who declined to name his case supplier. LED is not being used in open cases.

Why has Price Chopper thrown in its lot with LED? Longevity, for one. LED lights, which work well in a cold environment, last a minimum of 50,000 hours, or as long as the cases they are illuminating, said Smith. A motion detector, which turns the lights on as someone approaches, will allow an even longer life at one new store. In addition, LED lights, he said, now use 50% or less energy than that consumed by a fluorescent bulb.

LED also emits less heat than fluorescents, requiring less cooling action by the store's refrigeration system.

◆ By switching from a T8 [fluorescent] lighting to LED, you can reduce the [energy] by 100 BTUs per hour per door, ◆ said Smith. He also likes the lighting quality of LEDs. ◆ From an engineering perspective, the lighting level we have achieved is acceptable to our operation. ◆

Price Chopper has also begun using LED lights with exterior signage, where it also offers maintenance savings compared with fluorescent or neon lights, Smith said. The chain is testing LED in overhead lighting, as well.

Price Chopper is hardly alone in embracing LEDs. According to the Food Marketing Institute's Facts About Store Development 2008, 87% of surveyed supermarkets said they had installed LED lighting in the past year.

MacKenthun's, a one-store independent in Waconia, Minn., employs LED lighting in storefront signage as well as to accent signs in store departments. The store held off using LED lighting for cases a year ago but would now consider it, said Ed Gardeski, the store's general manager.

Food Farm, Kinston, N.C., has overseen the installation of LED lighting in both frozen doored cases and open dairy and meat cases at four independent Piggly Wiggly locations since November. ◆ The cases are 100% better from a merchandising perspective, ◆ said Bill Stovall, store planning specialist for Food Farm. ◆ They put more emphasis on the products. ◆ The cases are from Kysor/Warren but incorporate LED lighting from Nualight, Grand Rapids, Mich.



Fiber optic technology, used to light these cases at a Publix store, has been found more energy efficient than LED lights.

The directional aspect of LED it is good at focusing light on a single point enables it to focus on products, which enhances merchandising appeal, said Clay Rohrer, retail solutions innovation leader, Hussmann, a refrigeration manufacturer based in Bridgeton, Mo. With focused illumination, you don't have to waste as much energy as with fluorescents, which have no control over where the light is traveling.

ANOTHER OPTION

While LED has become the de facto alternative to fluorescent lighting in freezer and refrigerated cases over the past two years, it is not truly the only game in town. A handful of food retailers have chosen to use fiber optic lighting in vertical cases with doors, including Redner's Markets, Publix Super Markets, Whole Foods Market and Albertsons.

Redner's, Reading, Pa., which operates 39 Warehouse Markets and 12 Quick Shoppes stores, has installed the EFO-ICE fiber optics system from Energy Focus (formerly Fiberstars), Solon, Ohio, in freezer cases in 10 locations so far. Unlike fluorescent and LED lighting, fiber optic lighting systems sit atop the case, with light piped inside via fiber into acrylic rods. I am very pleased with fiber optics, said Doug Emore, operations manager for Redner's.

The lamp life for fiber optics is 15,000 hours, compared with 50,000 hours for LED, noted Julia Dolsen, marketing manager for Energy Focus. However, Emore speculated that fiber optics might outlast LED systems.

In my fiber optic setup, all I would have to change is one bulb, which takes two minutes; the fixture itself won't deteriorate, he said. Case manufacturers have been projecting that LED lighting could last up to 10 years, Emore said. But in five years if my cases are looking shabby, I'd have to rip out the LED fixtures and replace it. I wouldn't have to do that with fiber optics.

Emore also pointed out that fiber optic lighting saves more energy than LED and introduces no heat inside the case whereas LED produces some heat (though less than fluorescent lighting). I don't believe fiber optics has been given enough credit or study, he said. LED has taken over the majority of the market, but I don't think we should discount fiber just yet.

On the other hand, fiber optic lighting is not suitable for open horizontal meat and dairy cases, Emore said. For those cases, he will use LED lights. He is also testing LED lighting in vertical Kysor/Warren cases with doors in two recently remodeled stores. Over the next year or two, he will compare those LED cases with the fiber optic cases. LED is very impressive-looking, visually appealing, maybe brighter than fiber optics, he said.

Using an amp meter, Emore has already measured the energy usage of the LED cases and compared it with that of fiber optic cases. He found that fiber optic lighting is 18% more efficient than LED in terms of electrical consumption, not factoring in the heat introduced by LED. Fiber optics employs one-third as much energy as fluorescent bulbs, he added.

A study conducted by Southern California Edison two years ago found that in a three-door, low-temperature display case, LED and fiber optic lighting systems drew, respectively, 25% and 64% less power than fluorescent lighting. Cooling load reduction of the case was ♦minimal♦ for LED (125 BTU/hour) but markedly more for fiber optics (574 BTU/hour).

All things considered, Emore's preference is to use fiber optics in existing and refurbished freezer cases at remodeled stores. But since fiber optics is not being offered by major case manufacturers in new cases, he will opt for LED in those, at least until his main provider, Kysor/Warren, begins to offer cases with fiber optics.

Emore noted that the large manufacturers may be favoring LED lighting over fiber optics because LED is more versatile and has more applications. In addition to vertical cases, fiber optics has been applied to accent lighting over perishable departments like seafood and meat, but LED is being groomed to be used throughout the store, including overhead lighting.

The primary issue when it comes to the new breed of case lighting remains cost.

According to Dolsen, the comparative lamp prices of LED, fiber optics and fluorescent lamps are \$150-\$200, \$50 and \$5, respectively.

Price Chopper's Smith acknowledged that the price of LED lighting is still ♦significant,♦ though over time as the volume of LED production increases he expects the cost to drop and become a ♦non-issue.♦ Meanwhile, he put the cost at \$300 per door. With the long life of the lamp, the lower maintenance costs, and the greater energy efficiency of LED, he estimated the payback period to be between three and four years at that cost, depending on the price of electricity.

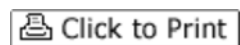
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