energy ADVISOR

BY WILLARD L. WARREN

In 1980, EE Tech, a division of Beatrice Foods, Inc., introduced electronic ballasts for the 4-ft T12 fluorescent lamp and received a federal grant to subsidize the cost in order to encourage sales and to determine how they fared in service. At a price of $20, all 1,000 ballasts were gone in weeks. Unfortunately, they all failed in service because they were not potted and the capacitors fried due to mutual heating effects with other components. More recently, *Consumer Reports* tested a number of store-bought, off-shore, screw-in, self-ballasted CFLs that also failed prematurely, probably for the same reason, though some of them never lighted—right out of the box.

Heat or "thermal management" plays a crucial role in today's electronic devices, especially LEDs. An LED must be heat-sinked with one or two pounds of aluminum or it cooks some other electronic component, which fails. What good is a life expectancy of 50,000 hours for the lamp if the other components fail prematurely? And a high operating temperature limits the maximum efficacy and maximum wattage of an LED and even degrades its lumen output.

We're all expecting an LED lamp on the market that will replace the popular screw-in PAR lamp and plug-in MR16 lamp with equal lumen output and comparable light distribution. I recently visited a start-up company in Connecticut, named Solais, that is making a screw-in LED PAR lamp for interior use that is ventilated and cooled by a frictionless, magnetic levitation (mag-lev) fan, originally created for the laptop computer industry. The ventilation keeps the LED 20 to 30 deg cooler than an aluminum heat sink can and the lamp has higher efficacy and can have a higher wattage with more lumens than previous models.

There's another new energy-conserving development in the use of wireless lighting controls introduced by Lutron Electronics Co., which has introduced a family of hand-held devices that can remotely control lighting units from a distance of 150 ft. In addition, the energy usage can be monitored by a central system that can measure the amount of energy savings accrued by the devices mated to them. The next logical step is to have the same type of wireless control for plug-loads and HVAC systems so that we can measure and manage lighting, plug-loads and HVAC loads. The utility bill is the ultimate report card and we must learn what contributed to it, and when.

MEASURE FOR MEASURE

The New York Times reported that users who live in areas where utilities have installed "smart meters" are receiving electric bills that are much higher than comparable ones for last year. Smart meters allow a utility to use a rate schedule of "real time pricing" (power-by-the-hour) and the meter will indicate to the user the billing rate in real time and the total kilowatt hours consumed to-date in the current billing period. When the utility is having difficulty meeting heavy peak demands, it will notify its customers to shed load and save money or incur higher rates for electricity. The only way to hold down the cost of increasing utility bills is with energy conservation and controls.

Some controls manufacturers are making claims for load reductions that may be out of date. For instance, if occupancy or vacancy controls can save 20 percent in electrical energy, and personal dimming controls and daylight harvesting also save 20 percent each, the total saving is not 60 percent, but 51 percent because of the law of diminishing returns. Actual total savings are subjective and can only be determined by measurement. Benchmarking and data comparison will be a great tool in managing load and identifying prospects for relighting and retrofitting.

LOOK ON THE BRIGHT SIDE

Another statistic quoted often is the percentage of electric energy consumed by lighting in commercial spaces. In 2003, the DOE reported it was 38 percent, and in 2009 ASHRAE reported that it varied from 20 to 25 percent, and they both could be right. According to NEMA statistics, which exclude foreign imports, there are about a bil-

lion linear fluorescent lamps in service, half T12s and half T8s. And in 2007, the dollar value of CFLs sold exceeded those of incandescents (again, excluding foreign imports). Unfortunately, there are still those 500 million magnetic ballasts in service and 100 million T12s will be sold as replacements this year.

In 2003, 26 million magnetic ballasts were sold. But this year, the last year they can be sold, it's down to one million. It is very likely that with all the energy saved by electronic ballasts and T8 lamps and by CFLs displacing incandescents, our industry deserves credit for cutting in half the percentage of lighting load in only six years, an incredible accomplishment.

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