The Coming Energy Crunch

Schools have dealt with energy cutbacks in the past, and that experience has taught us a few things. The National Lighting Bureau sheds some new light on this old problem.

by Bud Drago

Make no mistake about it, the energy shortfalls being experienced in California will spread to other parts of the nation. We've been remiss. For nearly a decade, utilities (with the aggressive support of public service commissions) emphasized demand-side management programs that encouraged more efficient use of electricity in an effort to forestall the need to enlarge our energy infrastructure. And forestall we did, until growth demanded more support than existing supplies could fulfill. But bringing new generating capacity on line takes time, and that delay is what will cause the shortfalls.

We experienced shortfalls in 1973-74 as a consequence of the OPEC nations' petroleum embargo. There were lessons learned from that experience. As energy prices climb and spot shortages occur, we can expect cutbacks in the most visible form of building energy consumption — lighting. Experience tells us that could be a serious mistake.

What We Have Learned

Are we suggesting that waste should be ignored? What about the millions of "old-tech" fluorescent tubes installed in classrooms from Nome to Key West? Should they be left in place? Of course not, but that doesn't mean that they should simply be replaced, tube for tube, with the new T8s. Good lighting requires thought and expertise. While T8 lighting will undoubtedly be called for, don't overlook the controls that make a lighting system much more flexible and versatile to meet the needs of everything going on in a classroom.

But classrooms are not the only areas of concern. Indoor and outdoor sports areas, as well as administrative areas and lounges, also need to be considered. In addition, we need to think about how the school is used after hours, and how it should be protected. After hours usually means nighttime, and that's when lighting can really make a difference. The purpose of the National Lighting Bureau (NLB) is to explain what that difference can be.

The NLB was created in the mid-1970s, when the energy crisis caused facility managers to do foolish things in the name of conservation. An item in one of the energy-focused magazines that sprang up about that time reported on an incident that occurred in a Social Security Administration data processing office, where a well-intentioned manager, focusing on energy savings, decided that about half the energy used for lighting could be conserved by deactivating about half the lighting. Records showed that as a consequence, productivity plummeted by 28 percent. What does this mean for a school? A lot, especially where administrative expense is concerned.

For example, assume that an administrative specialist earns a salary of $25,000 per year, and receives benefits (including Social Security, insurance, etc.) worth another $5,000, for a total of $30,000.

Now let's assume that the light the worker needs to accomplish his or her task is provided by six 40-watt (40W) fluorescent lamps. This lighting has a "connected load" of 40W x 6 x 1.1 (to account for ballast losses), totaling...
264W. Dividing 264W by 1,000 yields a load of 0.264 kilowatts, which consumes 0.264 kilowatt-hours for every hour of operation. Assuming an energy rate of $0.10 per kilowatt-hour, and assuming that the lighting is used 2,080 hours each year, the energy cost would be about $54.91 per year (0.264 kW x 2080 hrs./yr. x $0.10/kWh).

Someone could suggest that the worker could get by on just four lamps instead of six, and save one-third of the energy. But, using the figures above, we see that the dollar savings would come in at about $18 annually. If the lighting were such that it takes the worker longer to get the work done, even by just two percent, the value of the productivity lost would be $600, meaning that every energy dollar saved would generate a $33.33 productivity loss.

**A Brighter Solution**

Should “old-tech” lighting be left in place? Of course not; it wastes energy. Changes are a new system could be installed that would cut energy consumption in half. Even more important, that new system could be designed to help ensure that the worker’s lighting is optimized. In other words, by putting function first, it may be possible to generate energy savings of $25-$30 annually, along with productivity gains worth $300, $600 or more. (In many cases, “more” is likely, given that systems that rely on old technology were in many cases designed to support yesteryear’s “white paper tasks” rather than today’s computer tasks.)

By converting to lighting designed for the tasks involved, productivity can increase by five percent or more, error rates can be cut by 25 percent or more and absenteeism can decline, too, thanks to less glare in the workspace.

The key to maximized savings is to realize what the benefits can be, and then rely on effective design to help attain those benefits.

**What are the Benefits?**

To identify benefits, ask a simple question: “Why did we install lighting in here?” In office areas, it is to help people get their jobs done. The better the lighting, the better the job, meaning less labor cost per unit of work produced.

In classrooms, effectively controlled lighting can be used to help teachers teach. Lighting can be used to highlight chalkboards or whiteboards, to encourage students to focus more on what is being discussed, and can easily be equipped to achieve highly directional spotlight effects when appropriate.

The benefits of better lighting can be even more pronounced when the task involves eye-hand coordination. Here’s what the Cambridge (Wis.) Community Schools’ superintendent of building and grounds said about new lighting in the industrial arts classroom of the Cambridge Elementary School: “The instructor states that safety has improved considerably because of the better light at and around the machines. He told me that he feels that student accuracy increased by 40 percent, and that their errors have dropped by 15 percent.”

At Clark School, in Swampscott, Mass., children were ripping shingles off the roof at night, causing costly leaks, windows were being used for target practice and so on. Although the school had security lighting, it wasn’t very good. A new system was installed that provided better lighting (and consumed 64 percent less energy) and vandalism ceased. Combine the energy savings with the vandalism savings, and the new system paid for itself in 15 months.

These are not the only case histories in the National Lighting Bureau archives, but they all point to one important fact: New lighting can not only lower energy consumption and costs, it can better accomplish what it was installed to do — generate revenue and/or energy savings that result in payback in a surprisingly short time.

So, our experiences have taught us that we should not simply deactivate lighting in response to energy problems. Doing so will almost assuredly degrade people’s ability to perform visual tasks, and therefore may cost far more than is saved. Whenever possible, we need to take advantage of new lighting technology, but focus principally on the quality of light. A system that doesn’t get the job done wastes energy every time it is used, no matter how “efficient” it may be.

**Where to Get Help**

You cannot do it on your own. More general information is available free of charge at the National Lighting Bureau’s Website <www.nlbg.org>. There you will also find links to NLB sponsors (professional societies, trade associations, manufacturers, agencies of the federal government, utilities), as well as a number of other information sources. Need more help? The National Lighting Bureau will do its best to respond to your questions. E-mail them at <info@nlbg.org>.

Bud Drago is the Vice President of Marketing for the Simkar Corporation, a manufacturer of lighting fixtures and other lighting products. He also serves as an Adjunct Professor of Marketing at Immaculata College.