by Phil Sprague

Save energy and money in stairwells by choosing the right lighting options

For safety and to meet OSHA Requirements, stairwell lighting is typically required to run 24-hours a day, 7-days a week. Tests have been conducted using data loggers that suggest hotel stairwells are occupied 1% to 3% of the time.

Another problem noted in almost all hotels is that stairwells are significantly "over lighted." Using a simple light meter during our hotel energy audits, we have noted it is not unusual to find most stairwells providing up to 50 foot-candles of light throughout. By comparison, this is the light level recommended for a drafting room. OSHA Requirements specify an average of 15 foot-candles throughout the stairwell. This can be accomplished, for example, by having 10 foot-candles on one landing and 30 foot candles on the next.

Stairwell lighting costs

To compare various options to conserve energy, we will use a hypothetical ten-story hotel with two stairwells that have intermediate landings and there is a two-lamp four-foot fluorescent fixture on each landing. We will also assume the average cost of electricity for this hotel is $.12 per kilowatt hour.

Our first option will assume the stairwells are provided with two-lamp 40-watt inductive ballast fluorescent fixtures; one located over the entrance and one at the intermediate landing. The annual cost to operate these 40 light fixtures is $3,701. This type of lighting system offers only one option to reduce light levels and save energy. That option is simply to remove the two-lamp fixture at the intermediate landing as a test to determine if adequate light is still provided to the stairwells. It may be necessary to purchase a $25 light meter at Grainger's to verify light levels. If the stairwell can be sufficiently lit using only a single two-lamp fixture, this would save $1,850 per year, with very little investment, other than some engineering time to remove the fixtures.

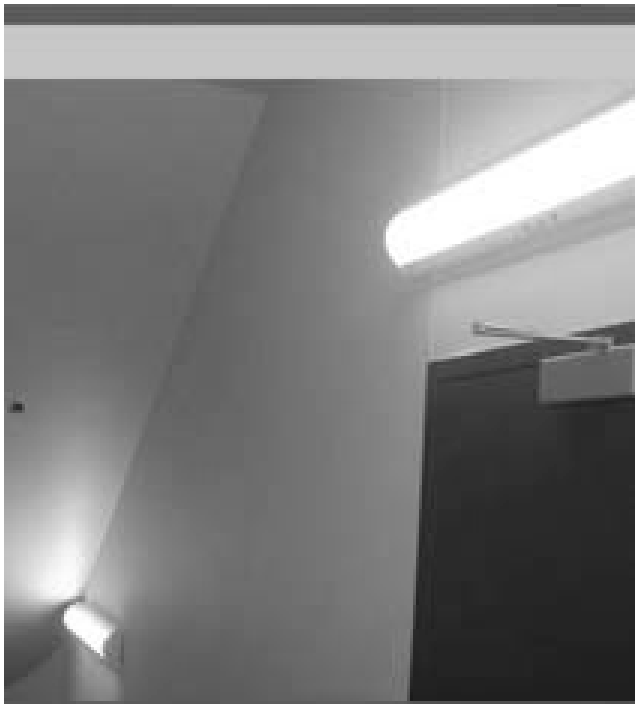
But do not try to save money by merely removing one lamp from each of the two-lamp fixtures, because the entire fixture will turn off. If you prefer to have just one lamp in each fixture, it will be necessary to install an electronic ballast, in which case it is likely more cost effective to simply put in new energy efficient "T-8" fixtures.

If a hotel is provided with new energy efficient "T-8" type electronic fluorescent fixtures, then there are several more options available compared to the old "T-12" fluorescent fixtures. As mentioned previously, the simplest energy saving opportunity is to simply remove the fixture in the intermediate landing and determine if light levels are adequate. For a "T-8" 32-watt fluorescent fixture in a ten story hotel, this will save $1,219, with very little investment.

If you prefer a more even lighting pattern in the stairwells, the electronic "T-8" fixtures will allow you to remove one of the two lamps in the fixture and the second lamp will operate at 100%. This will save $1,219 per year.

As noted, if your property is provided with the new energy efficient "T-8" fluorescent fixtures that are 32-watts, now would also be a very good time to reduce them to 25-watt "T-8" fluorescent

Pictured below: Bi-level lighting systems for stairwells incorporate an ultrasonic motion sensor constructed within the housing of the fixture that will reduce lighting level by about 90% when the stairwell is unoccupied. This typically conserves about 73% energy.



lamps. By removing half the lamps or half the fixtures, this option would save $2,060 per year.

As a special note, it is important to mention that if any of your hotel's stairwell fixtures are on the emergency lighting circuit, I recommend not tampering with them at all.

Bi-level lighting

As one might expect, technology is always providing new and unique methods of resolving difficult problems. For stairwells, this will consist of bi-level lighting. Bi-level lighting is a standard two-lamp four-foot fluorescent "T-8" fixture with an ultrasonic motion sensor constructed right within the housing of the fixture itself. When the stairwells are unoccupied, this fixture will reduce lighting level by about 90%, and conserve about 73% energy. For hotels that have the old style "T-12" fluorescent lighting, this would be an excellent option to examine if management is considering a lighting retrofit. Going back to our hypothetical ten-story hotel, this fixture would save about $2,590 per year. A rough estimated cost to install these fixtures would be $150 each, or a total cost of about $3,700. This indicates, without any rebates, the breakeven would be in the range of 1-1/2 years for this type of system. There is also a battery back-up option for emergency lighting in the stairwell that will provide minimal lighting during any power outage.

In addition to the significant energy savings of bi-level lighting, this project will likely qualify for a significant utility rebate. The Energy Policy Act of 2005 also allows for a tax deduction on these installations. Consult your hotel's tax advisor to determine how best to take advantage of this deduction.

Bi-level lighting systems in stairwells will soon become a construction standard in all hotels, offices and condominiums and will be a significant factor in reducing carbon dioxide pollution to the atmosphere. For more information on this subject and many other interesting energy saving opportunities, go to the website greenlodgingnews.com. ✧

(TRC's resident energy expert, Phil Sprague is a member of the AHLA Executive Engineers Committee and president of PSA Hotel Energy Consultants. Based in Minneapolis, PSA Hotel Energy Consultants assists lodging companies and individual properties to develop effective, cost-saving energy strategies by auditing and assessing all energy consuming devices and appliances, and delivering comprehensive, customized recommendations in an actionable format. They can be reached at 952-472-6900.)