

ENERGY-EFFICIENT STRUCTURE LIGHTING

By Donald R. Monahan, PE

Politicians and the general public have increased their attention on global warming in recent years. This enhanced awareness has resulted in new government and utility-sponsored programs that provide rebates and tax incentives to increase energy efficiency and encourage conservation. Retrofitting your parking facility with more energy-efficient lighting can not only benefit from these incentive programs, but owners can realize a more than 40 percent savings in lighting operational costs, equating to payback periods of often less than four years.

Conservation Incentives

The National Energy Policy Act of 2005 (EPACT 2005) contains a variety of tax credits and deductions for businesses and consumers that are designed to encourage investment in energy-efficient commercial buildings (see the March 2012 issue of *The Parking Professional* for more on this). For parking structure lighting systems, the amount of the tax deduction is the lesser amount of either \$0.30 to \$0.60 per square foot, or the costs incurred or paid for the system. The amount of the tax deduction is \$0.30 per square foot for a 25 percent reduction in lighting power density from that required by the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) 90.1-2001 publication, to \$0.60 per square foot for a 40 percent reduction, and prorated proportionately in between those values.

The ASHRAE 90.1 lighting power density requirement for parking garages is 0.3 watts per square foot. A lighting system with a lighting power density of 0.18 watts per square foot qualifies for the maximum deduction of \$0.60 per square foot. A lighting system with a lighting power density of 0.225 watts per square foot qualifies for a deduction of \$0.30 per square foot. The tax deduction is allowable in the year which the energy-efficient improvements are placed into service. New parking facilities and retrofitted existing parking facilities both qualify for the deduction. The current legislation expires December 31, 2013.

In addition, local and regional utility companies offer rebates for implementation of energy conservation measures. Visit dsireusa.org to find energy rebate programs in your state.

Energy-Efficient Lighting Design

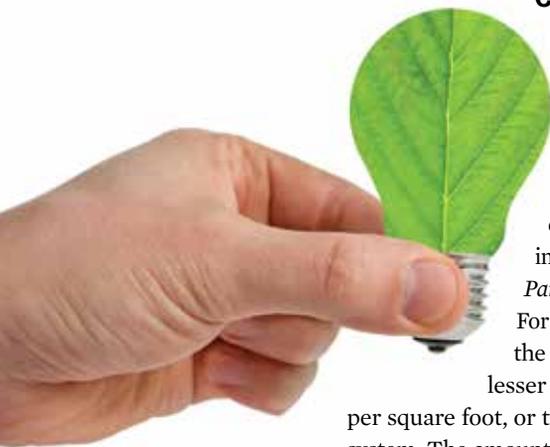
Advances in technology have resulted in more energy-efficient light sources than traditional high-intensity discharge (HID) lamps such as high pressure sodium (HPS) and metal halide (MH) lamps. Energy-efficient light sources include fluorescent, induction, and light-emitting diode (LED).

For security and safety, an average maintained illuminance equal to or greater than six footcandles on the floor is recommended by the Illuminating Engineering Society (IES) publication G-1-03, "Guide to the Design of Security Lighting for People, Property, and Public Spaces," for covered parking facilities. A typical lighting configuration consists of 150-watt HPS or 175-watt MH fixtures oriented on a 30-by-30 foot spacing at a mounting height of eight to nine feet. Including ballast watts, the total input wattage is 188 watts for the 150W HPS fixture, and 208 watts for the 175W MH fixture.

One example: a fluorescent light fixture with four T8 lamps or two T5HO lamps will provide equivalent illuminance on a one-for-one replacement basis as the 150W HPS or 175W MH fixture, while only using approximately 110 input watts. This lighting system saves 41 to 47 percent in energy costs. The lighting power density is approximately 0.12 watts per square foot, which represents a 60 percent reduction from the ASHRAE 90.1 energy limitation, and qualifies for the maximum EPACT tax deduction.

Incorporation of wireless lighting controls for occupancy sensing and daylight sensing can save an additional 50 percent or more in energy savings (see p. 46 for more on this).

Retrofitting your parking facility lighting system from HID fixtures to fluorescent or LED fixtures can save 40 percent or more on your lighting operational costs. Lighting rebates and federal tax deduction incentives reduce the net initial cost, resulting in payback periods that are often shorter than four years. **P**



DONALD R. MONAHAN, PE, is vice president of Walker Parking Consultants and a member of IPI's Sustainability Committee. He can be reached at don.monahan@walkerparking.com or 303.694.6622.