

ENERGY SMART LIGHTING



Recent advances in lamps, luminaries, controls, and lighting design provide numerous advantages over the lighting systems originally installed in many facilities. Offering high-efficiency alternatives for nearly every plant or office building, these technologies can enhance light levels, improve comfort and safety in the workplace, and reduce routine maintenance costs.

USE IN THE WATER/WASTEWATER TREATMENT PROCESS

Water/wastewater treatment facilities can immediately reduce operating costs simply by installing high-efficiency lights and fixtures and by changing how lights are used.

- **Advanced fluorescent lighting:** In most interior spaces, facilities can replace or upgrade existing fixtures to include high-efficiency fluorescent lamps, electronic ballasts, custom-designed reflectors, and appropriate lenses or louvers. New systems are particularly beneficial in computer-intensive environments where older lighting systems can cause glare on video screens.
- **High-intensity discharge lighting:** In outdoor applications and in warehouses and indoor areas with ceilings over 15 feet, facilities can replace highly inefficient incandescent or mercury vapor lamps with metal halide and high-pressure sodium lamps. High-intensity discharge lamps generate high lighting output, use a fraction of the energy required for incandescent or mercury vapor equivalents, and have substantially longer lamp life than incandescents.
- **Lighting controls:** Simple controls can eliminate unnecessary lighting in the many facility areas that do not require continuous lighting. Occupancy sensors detect the presence of personnel within an area and turn lights on and off accordingly. Time switches that turn lighting systems on and off are useful for outdoor signs, security lighting, and corridors. Dimming systems take advantage of daylight to further reduce energy use and costs. Photocell controls provide easy, effective on/off switching of outdoor lighting. In addition, photocells can be combined with time switch controls for areas that don't require lighting all night.
- **Maintenance:** A program of regular cleaning, replacement, and maintenance of lamps and luminaries can significantly save energy. A typical lamp, as it reaches 80% of its useful life, produces 15-35% less light due to lamp degradation. Dust, dirt, and other materials on lamps, reflectors, and lenses can decrease lighting output by 30% or more. Photocells used to activate outdoor lights should also be cleaned regularly.
- **General Operation and Maintenance:** For older space conditioning systems, replacing the

pilot light with an electronic intermittent ignition device will eliminate unnecessary energy use. To prevent energy losses caused by dirt, maintenance routines should include regular cleaning of the condenser, evaporator coils, and intake louvers. Regular cleaning of air filters alone can lower energy use as much as 20% and extend equipment life. Outside air economizers should be cleaned regularly and checked to ensure that they are functioning properly.

BENEFITS

Lighting accounts for 35-45% of an office building's energy use. Retrofitting existing lighting systems with high-efficiency alternatives is a strategic approach to helping improve a facility's profitability. In addition, new lighting technologies that improve light levels, eliminate flicker, or reduce glare can potentially improve worker productivity by decreasing eye strain and fatigue. Systems that enhance the reliability of lighting in industrial facilities can improve worker safety. Some potential benefits from lighting changes follow:

- **Fluorescent systems:** Replacing or upgrading individual fluorescent lighting systems offers high potential for energy savings. The most cost-effective retrofit application is replacing T-12 lamps and older "standard" magnetic ballasts with T-8 lamps and electronic ballasts. Although the higher-efficiency lamps cost slightly more, they provide higher-quality light while using 34% less energy.
- **High-intensity discharge lamps:** Compact metal halide or high-pressure sodium lamps are three to five times more efficient than incandescents, and produce three times the illumination. Because of longer bulb life, maintenance and replacement costs are lower. Metal halide lamps can approximate incandescent or fluorescent lamps in color quality and useful life (2,000-20,000 hours). High-pressure sodium lamps produce a golden-white lighting color that is preferable in warehouses and outdoor applications where color rendering is not critical; these have a long useful life (16,000-24,000 hours).
- **Controls:** Occupancy sensors can reduce lighting use by 25-50% compared to manual switching. Dimmable electronic ballasts, although fairly new, have proven quite successful.
- **Maintenance:** Building owners planning to follow a regular lighting maintenance program can design lighting systems using fewer fixtures. Implementing group lamp replacement and annual cleaning will reduce the amount of lighting needed to achieve minimum light levels, resulting in lower first costs and energy savings of about 15%.

COST CONSIDERATIONS

When approaching lighting enhancements, consider lighting as an interrelated system, rather than as individual components, to yield more satisfying and cost-effective results. Retrofits will save enough electricity to provide payback in two to three years, and less if financial incentives are available. Many electric utilities offer rebates and energy services to help facilities identify and implement methods for reducing lighting system energy use.

