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Hartford Steam Boiler
Reduce Lighting Systems Energy Costs

Risk Solutions

Hartford Steam Boiler
One State Street
P.O. Box 5024
Hartford, CT 06102-5024
Tel.: (800) 472-1866
www.hsb.com

Lighting systems alone can account for 25 to 30 percent of a facility's energy cost. In many cases, lighting is the single largest cost component of the electricity bill.

In addition to supplying necessary lighting, all lighting systems produce heat. Lighting-produced heat is a major source of heat gain inside a building and presents a considerable added load to the air conditioning system. An energy-efficient lighting system can cut this cost component of your electricity bill by one-third.

There may be many opportunities to improve energy efficiency within your lighting system. Listed below are some items to consider. Some are easy and offer quick payback. Others involve comprehensive upgrades and offer long-term energy savings. For large projects, perform a pilot or trial installation to assess energy use and user acceptance.

LED (Light Emitting Diode) Lighting

An LED is an electronic diode device that produces light and heat when it conducts. LEDs have been used as indicating lights on electronic equipment for a very long time. In recent years, LEDs have advanced into the general illumination products market. Many lighting products such as flashlights, desk lamps, under-counter lights, supermarket refrigerated case lights, automobile stop and tail lights, exit lights and traffic signal lights now use LEDs as the preferred light source. LED lighting products are now available that can replace parking lot lights, fluorescent lights, recessed lights and decorative commercial lighting fixtures.

LED general illumination product advantages over other light sources include:

- Small physical size allows for space efficient fixtures
- High efficiency affords low operating costs
- No actual filament to burnout provides long life
- Contains no mercury avoiding hazardous disposal requirements
- No warm up time required for full brightness
- Works very well in low temperature conditions

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LEDs general illumination product disadvantages include:

- High initial cost due to new evolving markets and limited acceptance
- Limited field track-record for new lighting applications
- Degraded performance in high-heat ambient conditions
- Variations in light color-quality among production runs

LEDs have been integrated into many portable lighting products over many years. LED costs have decreased and there has been widespread use and acceptance by consumers. The use of LED technology as a replacement for the traditional fluorescent fixture or the parking lot fixture is the question debated by many designers and owners. The decision to use the newer LED fixtures or fluorescent fixtures for general illumination applications will depend on cost differentials, government or utility subsidies, and building life-cycle cost analysis.

Fluorescent Lamps

If you are still using inefficient T12 fluorescent lamps with magnetic ballasts, consider switching to energy-saving T8 lamp technology and electronic ballasts. Fixture upgrades allow the lighting engineers to design the proper Illuminating Engineering Society (IES) foot-candle lighting levels for each space. IES lighting levels depend on many factors such as age of occupants, tasks performed and availability of supplemental task lighting fixtures.

Electronic ballasts operate fluorescent lamps at a higher frequency, which improves system efficiency by about 30 percent when used in conjunction with T8 lamps. Electronic ballasts also offer many advantages.

They are less noisy and have virtually no lamp flicker. They have a dimming capability (with specific ballast models). They can power up to four lamps, increasing energy efficiency by an additional 8 percent, while reducing first cost and maintenance costs.

In addition instant-start circuitry offers an additional 5 percent efficiency compared with rapid-start electronic ballasts. However, if lamps are frequently switched on and off, additional lamp and maintenance costs may exceed energy savings.

Programmed-start ballasts offer increased lamp life compared to instant or rapid-start ballasts. Programmed-start ballasts are designed to soft start the lamp, which decreases lamp cathode damage. These ballasts are a good choice when lamps will be switched on and off frequently (e.g., spaces with occupancy sensors).

Incandescent Lamps

If you are using inefficient incandescent bulbs, replace 60- to 100-watt lights that are used several hours a day with efficient, compact fluorescent lamps.

For outdoor lighting, fluorescent flood fixtures can provide more light at less energy than incandescent lights. A typical replacement example could be two 75-watt compact florescent fixtures that are used to replace two 300-watt flood fixtures.

Turn the Lights Off

Ultrasonic or infrared occupancy sensors for restrooms and similar areas often help better match lighting requirements and result in lower energy consumption. Time delays within the sensors can be set to avoid frequent on/off operations. Many room occupancy sensors incorporate photocells that can dim or turn the room lights off when there is enough natural light entering through perimeter widows.

Certain non-critical lights should be considered for inclusion in a computer-controlled energy management system. Time-based control systems for indoor lighting typically include a manual override option for situations when lighting is needed beyond the scheduled period.

Exit sign fixtures are required and their light sources are always on. For this reason, these fixtures need to be efficient. Only use Energy Star labeled exit signs that utilize LED light sources.

Power Quality

The lighting system affects the power quality of the building electrical distribution system.

Poor power quality wastes energy, reduces electrical capacity, and can harm equipment and the electrical distribution system itself.

Upgrading to lighting equipment with a rated high power factor and low harmonic distortion can improve the overall electrical system power quality.

Upgrading with higher efficiency lighting equipment can reduce loading on branch circuits and allow capacity for new future loads. This benefit alone may justify the cost of a lighting upgrade.

Maintenance

All lighting systems experience a decrease in light output and efficiency over time from three factors:

- Lamp-light output decreases (lamp lumen depreciation)
- Dirt accumulates on fixtures (luminaire dirt depreciation)
- End-of-life lamp failures

Fixture and lamp aging factors can reduce the lighting foot-candle output by as much as 60 percent.

Establish a group-relamping maintenance schedule for replacing lamps as well as fixture cleaning at scheduled intervals.

Re-lamping is usually performed at about 70 percent of the rated lamp life. A typical four foot fluorescent lamp life is 20,000 to 30,000 hours. Labor-wise, this process is more cost-effective than spot-replacing lamps as they burn out.

NOT IF, BUT HOW