

Energy Efficiency -- Lighting

This tip sheet corresponds with Green Star Award Standard # 4 – Reduce Energy and Water Consumption. Another useful tool is Chapter 6 of “Becoming a Green Star: A Waste Prevention Guide for Anchorage Businesses.”

You can find the guide online in pdf and html format at www.greenstarinc.org/guideindex.php or request a hard copy from Green Star.

Why Consider Lighting?

Energy efficiency is one of the most effective areas to save your business money, and lighting is the easiest way to increase energy efficiency in the workplace. Lighting comprises 31% of the energy use in commercial facilities, according to the U.S. Department of Energy.

Energy Efficiency to a “T”

Fluorescent tubes (called lamps) are identified by their wattage, and diameter. For example, an F38T12 is a fluorescent lamp using 38 watts, and it is 12/8” or 1 1/2” in diameter.

T-12s are the standard fat fluorescent lamp that most offices have. The energy efficiency has improved from a standard of 40 watts to a more efficient 34 or 38 watts per lamp. Check the numbers printed on one end to be sure of the wattage. T-12s come in 4’ and 8’ lengths.

T-8s are slimmer at 1” (8/8”) in diameter. They also are more efficient, using about 20% less energy than a T-12. They typically use 32 watts but also come in 24 and 28 watts. All give off more light per watt than a T-12. They come in 4’ and 8’ lengths.

T-5s are even slimmer at 5/8”, are shorter than the other lamps at only 45” long, and are even brighter than a T-8 lamp. They are not a retrofit option because they are shorter than T-12 and T-8 lamps but are popular for indirect and display lighting uses in remodels or new construction. Overhead uplighting and high-bay warehouse lighting are good uses for T-5 lamps.

Overhead Lighting

Overhead lighting in the workplace is usually fluorescent. If your workspace still has T-12 lamps in the light fixtures, consider retrofitting your lamps to a more energy efficient variety. T-8 lamps are the new energy-efficient standard in most applications. In high ceiling applications or indirect lighting fixtures, T-5s may be appropriate.

Upgrades may involve updating the ballasts too. Ballasts are needed for all fluorescent lamps. The ballast can be a separate electrical device or an integrated part of a fluorescent or discharge lamp. It is required to start and regulate these types of lamps. Newer electronic ballasts use less energy than the older magnetic variety.



How Bright is Light?

Incandescent light bulb = 15-20 lumens/watt (range of 35 watts to 150 watts typically)

T-12s w/ magnetic ballast = 55-65 lumens/watt
(4’ lamp = 34-40 watts) 12-20,000 hrs lamp life

T-8s w/ electronic ballast = 90-95 lumens/watt
(4’ lamp = 32 watts) 20-30,000 hrs lamp life

T-5s w/ electronic ballast = 105 lumens/watt
(45” lamp = 28 watts) 20,000 hrs lamp life

High-pressure sodium = 90-105 lumens/watt
24,000 hrs lamp life

The pupil is more receptive to light at the blue end of the spectrum so the lumen output of T-5s seem to the eye to be even higher, while many incandescents seem even lower.

Other appropriate, efficient lighting for high-ceiling areas include several types high-intensity discharge (HID) lamps. HIDs provide the highest efficacy and longest service life of any lighting type. They are commonly used in outdoor lighting and large indoor arenas. The common types are mercury vapor, metal halide, or high-pressure sodium. If replacing incandescents, these lamps can save 75% to 90% of lighting energy.

Task Lighting

Task lighting includes lamps on desks, and specific lights directed at a specific work area. Task lighting is what we use to see our work so consider it carefully. Most desk lamps or torchieres use incandescent (or halogen) bulbs. These are the least efficient type of lighting. About 90-95% of the energy that goes into an incandescent bulb goes into heat production, leaving only 5-10% to generate light.



Consider switching your incandescent bulbs to compact fluorescent lamps (CFLs). CFLs come in a variety of shapes, sizes, and wattages. They also are now available in 3-way and dimmable varieties. They can be ordered on-line or found at The Home Depot, Lowe's, Fred Meyer, or specialty lighting stores in Anchorage. Each lamp uses about 70-75% fewer watts than an incandescent bulb to produce the same amount of light (lumens). For example, a 75-watt bulb can be replaced with a 20-watt CFL to produce the equivalent 1,200 lumens; a 100-watt bulb can be replaced with a 27-watt CFL to produce the equivalent 1,750 lumens.

Speciality Lighting

This includes exit signs, elevator lighting, stairwells, and security lighting. For electric exit signs, LED lights offer the best energy efficiency for lighted exit signs. LEDs use so little energy that some signs are equipped with their own battery backup system. And LED exit signs can last up to ten years without needing lamp replacements. For non-electric signs, consider photoluminescent (PL) signs. These use no electricity and last indefinitely but require another light source to recharge. These are best used in areas that are well lit for at least part of each day.



In elevators, which are small, enclosed spaces, the use of incandescent lighting often is quite obvious by the amount of heat the bulbs give off. Switching to CFLs will reduce heat build-up.

Stairwell light fixtures in commercial buildings normally operate 24/7, using large amounts of energy to illuminate mostly unoccupied stairs, alcoves and landings. Newer light fixtures exist that will dim to about 50% power and 33% light after 15 minutes of no occupancy.

Outdoor Lighting

Don't forget to consider building perimeter and parking lot lighting when you look at your lighting efficiency. One problem that is often encountered with outdoor lighting is the assumption that more light equals better security. That is not the case because brighter lights make darker shadows and actually create more hiding places.

Motion sensors that increase low lighting when movement occurs in the area create an energy efficient and safety conscious system. Hybrid pathway lighting is available that includes light-sensor controlled LEDs combined with brighter motion-sensor controlled fluorescents.

Timers for outdoor lights are often problematic in a latitude where we gain or lose light so quickly. Keeping up with the changes can be a full-time job. Light sensors are better equipped for ensuring that lights are only on when needed.

Behavior Changes to Save Energy

Often it is not the equipment that is wasting energy but the user. Here are some behavior change tips that will help reduce lighting energy costs.

- Turn off the lights when you leave a room.
- Use only the amount of light you need by limiting the number of lights turned on, and using dimmer or 3-way switch features where they are available. Use task lighting instead of overhead lighting where possible.
- Keep lamps, reflectors, shields, and shades clean. Dust and dirt can reduce light levels by as much as 50%.

Off or On?

It is a myth that it costs more to turn off fluorescent lights than to leave them on. When you leave a room, for no matter how short a time, it's always better to turn off the lights. The energy you save in turning off the light more than makes up for the very small reduction in lamp life caused by turning the lamp on and off.



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