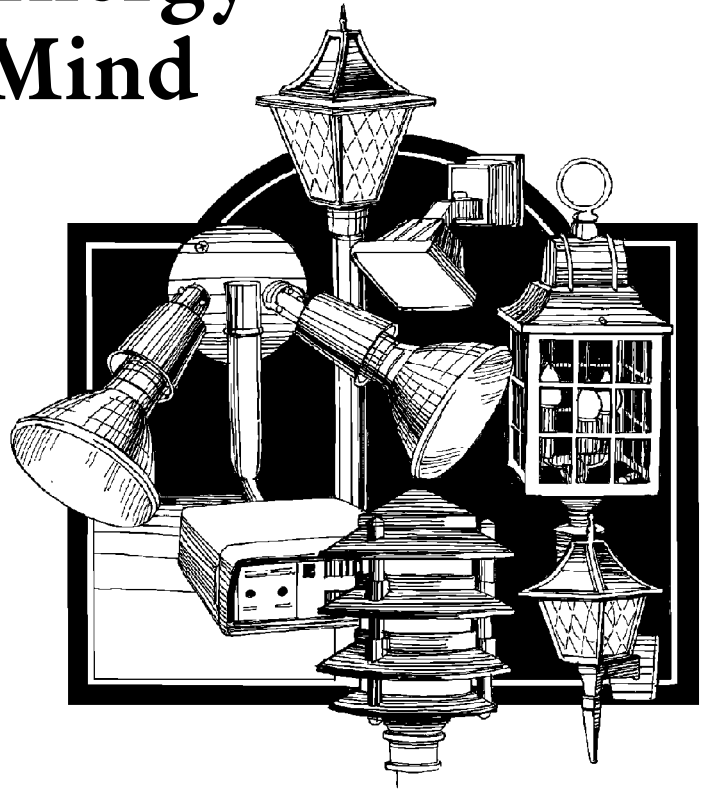


Lighting With Energy Efficiency In Mind

Lighting technologies developed in the past 10 years can help us cut lighting costs 30% to 60% while enhancing lighting quality and reducing environmental impacts. To save lighting energy you can lower wattage, reduce the light's on-time, use daylight, and perform simple maintenance tasks.

In addition, a design that recognizes what tasks will occur in a given area and sizing the lighting to that task will maximize the energy dollars. Whether using general energy cost cutting measures or designing the lighting specifically for a given area, it is important to consider the quality of the light, which can affect the level of comfort.



Light Quality

Light quality affects how well people can see to do visual tasks and how visually comfortable they feel. Light quality is important to energy efficiency because spaces with higher quality lighting need less illumination. High-quality lighting is fairly uniform in brightness and has no glare.

Categories of Lighting

There are three categories of lighting you must consider in planning:

- **Ambient lighting** provides security and safety, as well as general illumination for doing daily activities.
- **Task lighting** provides enough illumination that tasks can be completed accurately but not so much light that entire areas are illuminated.
- **Accent lighting** illuminates walls so they blend more closely with naturally bright areas like ceilings and windows.

Types of Lighting and General Characteristics

The four basic types of artificial lighting are incandescent, fluorescent, high-intensity discharge, and low-pressure sodium.

Incandescent is the least expensive to buy and the most expensive to operate. It has the shortest life span of the common lighting types and is relatively inefficient compared with other lighting types. The most common types of incandescent lights are standard incandescent and tungsten halogen.

Here are some points to remember when considering incandescent usage:

- Larger wattage bulbs may not be the most energy- or cost-effective option, depending on how much light is needed.
- Excessive wattage creates unnecessarily high illumination.
- New reduced wattage lamps use approximately 15% less power.
- Select the right incandescent lamp for the job.
- New incandescent fixtures are designed to force all their light out into the room. Reflector (R) lamps and ellipsoidal reflector (ER) lamps are two examples of new fixtures. The ER lamps outperform R lamps because of how the light is reflected out of the lamp.
- Although long-life bulbs last longer than their regular counterparts, they are normally less energy efficient.

- Replacing incandescent lamps with compact fluorescent lamps provides energy savings of 60% to 75%. Tungsten halogen bulbs use about 60% less power than standard incandescent and provide longer service. They are considerably more expensive than standard incandescent.

Fluorescent is an energy efficient lighting choice because it is about four times as efficient as incandescent lighting. They are not all energy efficient, so shop carefully.

- Fluorescent lighting is used for both ambient and task lighting because the low brightness creates less direct glare than do incandescent bulbs.
- They normally last about 10 times longer than incandescent.
- Install fluorescent in places where they will be on for several hours at a time.

The following points will help in selecting the best fluorescent light bulbs:

- Select lights with a mid range temperature 3500-5000K. This will be the preferable light for a residence.
- Select fluorescent bulbs with electronic ballasts.
- For compact fluorescent, select a ballast base that is separate from the bulb. The ballast will outlive the bulb, letting you change the bulb only.
- Select the longest rated life.
- The efficiency of lights is measured by the amount of lumens created per watt of electricity expended. For example, fluorescent lights may range from 22-85 lumens per watt.
- Compact fluorescent lamps (CFLs) combine the efficiency of fluorescent lighting with the convenience and popularity of incandescent fixtures and save up to 75% of the initial lighting energy.
- The Color Rendering Index (CRI) is often the only information available for compact fluorescent. Select a CRI closest to 100, which is the best.

High-Intensity Discharge (HID) lights are similar to incandescent in appearance and compactness with concentrated and directed light output. However, they operate similar to fluorescent. They are most suitable for outdoor/security lighting.

- They are very energy efficient and provide a very long service life.
- They can save 75% to 90% of lighting energy when they replace incandescent lamps and fixtures.

Low pressure sodium lights are the most efficient artificial lighting and have the longest service life. Where color is not important, this light is a good choice because it renders all colors as tones of yellow or gray. Security lighting often uses this type of lighting.

Improving Lighting Controls Can Save Money

Lighting controls are simply devices for turning lights on and off or for dimming them. The various types include a standard snap switch, photocells, timers, occupancy sensors, and dimmers.

- Three-way snap switches make it easier to turn off lights in unused areas.
- Photocells respond to natural light levels. For example, photocells switch outdoor lights on at dusk and off at dawn. Some advanced designs gradually raise and lower fluorescent light levels with changing daylight levels.
- Mechanical or electronic timers automatically turn on and off indoor or outdoor lights.
- Occupancy sensors activate lights when a person is in the area and then turn off the lights after the person has left.
- Dimmers reduce the wattage and output of incandescent and fluorescent lamps but will save energy only when used consistently.
- Dimming fluorescent requires a special dimming ballast and lamp holder but does not reduce their efficiency.

Daylighting

Daylighting simply means using daylight for indoor lighting. Homes can be designed for usage of natural lighting, but it does present two areas of concern. The first is the heat gain that can result when natural light is brought into a home. In Mississippi, this is an especially important concern, but the heat gain from natural light can be an advantage in winter in most of the state. Second, the ultraviolet (UV) rays in natural light can discolor and weaken fabrics and other materials when natural light strikes them.

Design Considerations for Daylighting

Some simple design strategies and materials can facilitate the energy saving advantages of natural light. These include the following:

- Light colored interiors and open floor plans are good for both natural lighting as well as artificial light efficiency.

- Avoid glare by using window-sills, walls, louvers, reflective blinds, and other devices to reflect light deep into the building.
- Locate windows away from the sun's direct rays to avoid overheating.
- Select glazed windows that transmit the most visible light while keeping out the most solar heat.
- Size overhangs on windows to prevent direct light from entering except when and where you want it in the heating season.
- Avoid east or west facing areas for daylighting purposes unless they are shaded by trees or other means. An overhang will not block direct light for east and west orientations.
- Because the amount of light decreases as you move away from a window, light colored walls and ceilings reflect light in a diffuse manner and aid the effectiveness of the natural light.
- North and south facing windows provide the best light. South facing windows must be protected from the sun by an overhang.
- Rooms that use natural light can have frequent varying requirements for artificial light. A fluorescent light with "daylighting" ballast dims the light output if natural light levels or other light sources are providing adequate light.
- In low light areas, cove lighting is an alternative. Often cove lighting is provided by low wattage fluorescent lamps or low voltage lights hidden behind a decorative valance in the upper third of the wall. The reflected light provides even light throughout the room.
- For outdoor lighting, photocells respond to daylight levels and activate the light operation when dark. Photocells with an infrared or ultra-sonic detector activate the lighting circuit for nighttime operation, and the sensor turns on the light, responding to the presence of people.
- Occupancy sensors used in rooms that do not have natural light operate the lights only when people are present.
- Venetian blinds can be angled to bounce the light to the ceiling, reducing glare.
- Avoid skylights that cause excessive heat gain in summer and excessive heat loss in winter.

Natural light that is not too bright or glaring or too hot will significantly add to the comfort of the residents.

Maintenance

Proper maintenance is vital to efficient lighting. The amount of light produced decreases over time because of aging lamps and dirt on fixtures, lamps, and room surfaces. This can reduce total illumination by 50% or more, while lights continue drawing full power. These basic maintenance suggestions can help prevent this:

- Clean fixtures, lamps, and lenses every 6 to 24 months by wiping off the dust. Never clean an incandescent bulb while it is turned on or it is hot.
- Replace lenses if they appear yellow.
- Clean or repaint rooms in your home every 2 to 3 years. Dirt collects on surfaces, reducing the amount of light reflected.
- Because fluorescent lights and some compact fluorescent lamps contain small amounts of hazardous chemicals, dispose of them with other household hazardous wastes such as batteries, solvents, and paints at your community's designated drop-off point.

Optimize Energy Efficiency and Lighting Quality

Simple changes in the lighting can improve lighting quality, make visual tasks easier, and save money on energy costs. Consider the following:

- Reduce light levels where there are no visual tasks.
- Provide necessary light for safety, security, and aesthetics.
- Provide adequate light levels for visual tasks.
- Provide task lighting based on the difficulty of visual tasks.
- Reduce glare and brightness contrast.
- Use daylight where possible and practical.

The concept of better light can equal less cost is one that every homeowner can adopt with very little problem. A little planning and willingness to think differently about your lighting can provide significant savings.

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