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Lamps, Ballasts, Light Fixtures, and other electrical supplies can be purchased using a statewide contract with Graybar.

#001B3400442

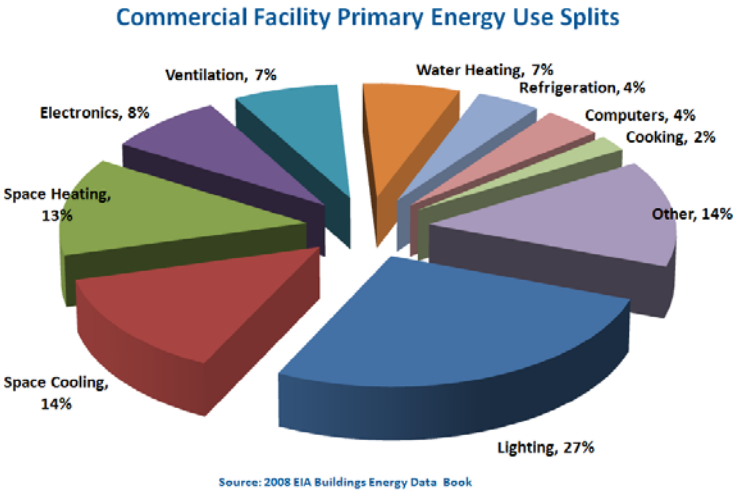
The contract terms encourage state buyers to purchase ENERGY STAR qualified lamps, ballasts and fixtures and prohibits purchase of:

- Incandescent exit signs
- Standard incandescent lamps
- Mercury vapor HID lamps
- Mercury vapor ballasts
- Certain metal halide probe-start ballasts
- Magnetic T12 and T9 circular ballasts
- 2-pin magnetic ballasts
- Preheat magnetic ballasts

Fall 2013 Product Focus: Interior Lighting

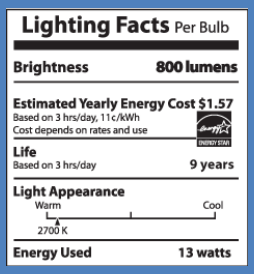
The Importance of Lighting

In addition to providing visibility and contributing to safety, security and productivity, lighting is the largest cost component of a commercial building's electricity use and total energy bill.



Did You Know…

The Federal Trade Commission requires products to carry a label to help consumers easily compare energy-efficient light bulbs.



Lighting systems produce large amounts of heat as well as light. This *waste heat, or 'heat gain'*, may be useful when the building requires heating, but it is counterproductive when the building requires cooling. Energy efficient lighting that minimizes the heat produced per unit of light output will also reduce the energy required for cooling.

Light Output and Appearance

A successful lighting design requires an assessment of occupants' lighting needs, which depend on the tasks performed in a space. Retrofits that skip a lighting assessment may perpetuate designs that have become inadequate because of workspace rearrangements or changing tasks (for example, moving from paper-based to computer-based tasks). Issues to consider in addition to daylight availability, light distribution, and visual tasks, include:

Light Output

Visible light emitted by a source, expressed in lumens. A lamp with high lumens will provide more and brighter light. A lamp with lower lumens will provide less and dimmer light.

Illuminance

Incident light illuminating a surface (sometimes referred to as 'brightness'), expressed in foot candles.

Foot Candle (fc)

Luminance from one lumen on a one square foot surface.

Color Temperature (CCT)

Characteristic of visible light, measured from warm to cool on the Kelvin (K) scale. Color temperatures over 5,000K are considered cool (blueish white), while color temperatures between 2,700K –3,000K are considered warm (yellowish white through red).

Color Rendering Index (CRI)

Ability of a light source to render a sample of eight standard colors relative to a reference source (measured on a scale of 0 to 100). CRI is an average value and in general, high-CRI light sources render colors better than low-CRI sources. A CRI of 80 or greater is considered by the industry to provide excellent color rendering.

Glare

When luminance (amount of light reflected back from a surface) levels - or the difference in luminance - are too high and objects appear too bright, causing eyestrain and fatigue. Indirect lighting fixtures can control both direct and reflected glare by creating large areas of moderate brightness rather than small areas of high brightness that cause discomfort and impaired visibility.

ENERGY STAR qualified commercial lighting products:

- Use at least 75% less energy than incandescent lighting
- Reduce maintenance costs - fluorescent lighting lasts at least 10 times longer than incandescent lighting and LED lighting lasts 35 to 50 times longer.
- Produce very little heat.
- Have a minimum three-year warranty

LED lighting has been qualified for the ENERGY STAR label since 2008.

FEMP (Federal Energy Management Program)

Products that meet FEMP-designated efficiency requirements are in the upper 25% of their class in energy efficiency, and include energy-consuming products not covered by the ENERGY STAR program.

Lamp Life

Average Rated Life (ARL) is based on laboratory tests of representative lamps - determined when 50% of the lamps initially installed in a test batch fail. For example, an ARL of 1000 hours indicates that 50% of the lamps had died when the test time reached 1000 hours (regardless of how many hours each lamp lived).

Rated life does not account for the lumen depreciation and color shifting that always occur as lamps age. Aged lamps with lower light output (lumen depreciation) continue to consume the same (or more) electricity. Color shifting (changes in CCT) accelerates and becomes noticeable in the last 40% of "rated life" when spot replacements of failed lamps makes the difference in color between new and old lamps obvious.

Efficacy

In the past, lamps were often purchased based on how much energy (watts) they used. Purchasing lamps based on the light they provide – lumens instead of watts – makes far more sense. "Efficacy" refers to the amount of light produced by a lamp (measured in lumens), as a ratio of the amount of power consumed to produce it (measured in watts) – lumens per watt.

Light Sources

Light sources vary widely in their efficacy, efficiency, color quality, service life, and application. Incandescent lamps are quickly being replaced in both residential and commercial applications by compact fluorescent and light-emitting diode (LED) lamps. Linear fluorescent lamps have been used since the early 20th century for general-purpose interior diffuse lighting and high-intensity discharge (HID) lamps for industrial and exterior lighting. Due to technical advances and new products, fluorescent lamps are now an effective choice for many industrial and exterior applications and metal halide HID lamps are now a good choice for some interior uses. The ideal lighting design takes advantage of daylight and incorporates lamp/ballast/fixture combinations that will maximize energy efficiency and efficacy; provide appropriate light level, temperature and CRI; allow for flexibility; and control glare.

Source - lamp type	Efficacy, incl. ballast (lm/W)	ARL	CRI	Typical applications
Linear fluorescent (T5, high-performance T8)	80 to 97	20,000 to 30,000	80 to 85	General area lighting of all kinds, including open and closed offices, classrooms, and high-bay areas
Compact fluorescent	43 to 71*	6,000 to 12,000	80 to 85	Incandescent replacements in table and floor lamps, cans, wall washers, and sconces
Quartz pulse-start metal halide	60 to 80*	20000	65 to 70	Outdoor lighting, high-bay lighting, and remote-source lighting
Ceramic pulse-start metal halide	60 to 80*	20000	85 to 94	Where color is critical, including high-bay and retail applications
High-pressure sodium	60 to 110*	24000	22	Outdoor lighting and in high-bay applications where color is not critical
Induction	50 to 60*	100000	80	Where maintenance costs are high, including roadways and tunnels, parking garages, escalator wells, warehouses, and malls
LED	45 to 85	50,000^	65 to 90	Color-based applications such as exit signs, display and mood lighting, as well as street and parking lighting, task and accent lighting, and, increasingly, fluorescent replacements in general area lighting

Courtesy: E Source
* Higher efficacies for higher-wattage lamps.
^ Time at which output has degraded to 70 percent of initial output.

NEMA Premium

NEMA Premium

NEMA Premium Electronic Ballast Program

The NEMA Premium Electronic Ballast Program provides the method for identifying the most efficient T8 fluorescent ballasts available in the market and identifies models that are consistent with the Consortium for Energy Efficiency (CEE) specifications for high performance lamps and ballasts, tested in accordance with ANSI C82 Standards.

NEMA Premium Exit Sign Program

The NEMA Premium Exit Sign Program provides the method for identifying efficient and effective models that are consistent with NEMA performance standards and tested in accordance with applicable UL and CSA Standards.

Linear Fluorescent Compact Fluorescent HID (metal halide) LED

Ballasts

Ballasts are pieces of equipment required to control the starting and operating voltages of fluorescent and HID lamps. Magnetic ballasts are an old inefficient technology and are increasingly being replaced with electronic (high-frequency) ballasts, which are cost-effective, 12% more efficient than magnetic, and eliminate flicker and hum. Starting method and input must both be considered and most lamps are only compatible with one starting method. The major exception is high-performance T8s, which can use either rapid- or instant-start ballasts. CEE Qualified (high-performance) ballasts are the most efficient (defined by the Consortium for Energy Efficiency).

Relamping and Energy-Efficient Retrofits

Lighting-efficiency measures such as relamping with high-performance lamps and ballasts (replaced at burnout), delamping, and controls can achieve deep savings with a short pay-back, while maintaining lumination levels. There are two ways to relamp:

Spot relamping is replacing lamps only when they burn out.

Group relamping is replacing all lamps in a given space at one time – normally at 60 to 80 percent of rated lamp life. It can result in brighter and more-uniform lighting (by replacing lamps experiencing lumen depreciation and color shifts) and can be combined with other maintenance activities such as ballast and reflector inspection and lens cleaning or the retrofitting of reflectors, ballasts, or lenses. Group relamping can be scheduled outside working hours, delegated to trained contractors, and require less labor on a per-lamp basis than spot relamping.

Consider: Compared to a base case system of fixtures containing four energy-saver T12 lamps with magnetic ballasts, an upgrade to standard T8 lamps and electronic ballasts can produce energy savings of more than 25 percent and a 5-6 year pay-back; using high-performance T8 lamps boosts savings to more than 40 percent with a 3-4 year pay-back.

Adding reflectors and new lenses to fixtures enables delamping (simply removing lamps)—to two high-performance T8 lamps—with little loss in light levels, for a savings of 71 percent compared and a 2-3 year pay-back. Adding occupancy sensors and daylighting controls can boost savings to more than 80 percent compared to the base case, and more than 50 percent compared to a system with standard-grade T8 lamps and electronic ballasts.

Replacing fixtures, rather than upgrading components (lamps, ballasts, etc.) can be more costly and disruptive, but new fixtures are a good approach if you want to convert from direct to indirect lighting, use a different light source, incorporate advanced lighting control technologies, or provide lower levels of ambient lighting while increasing task lighting levels.

* Sources: US Department of Energy and Energy Star

Hazardous Materials and Disposal

Many lamps contain mercury and are therefore considered hazardous waste under the Resource Conservation and Recovery Act (RCRA), including fluorescent, HID, mercury vapor, HPS, and metal halide lamps. Generally, ballasts manufactured after 1978 contain the statement "No PCBs," meaning they have not been found to contain polychlorinated biphenyls (PCBs). The disposal of PCBs is regulated under the Toxic Substances Control Act (TSCA).

Maryland Department of Environment Universal Waste Rule Implementation (COMAR 26.13.10) includes standards for managing lamps, mercury-containing equipment, or PCB-containing lamp ballasts.