Business Energy Services

LIGHTING

According to the U.S. Department of Energy (DOE), lighting accounts for one-third of the electricity consumed by businesses and more than one-half of the usage in the hospitality and retail sectors. Lighting is also estimated to offer the largest and most cost-effective potential for energy savings. Understanding the technology is a key component to implementing a successful energy-efficient lighting project and NV Energy's Business Energy Services can help you save.

Color Temperature

Kelvin Color Temperature Scale

The lighting industry uses this scale to identify the hue of a white light source. A hue's temperature is measured in degrees Kelvin (K).

Color temperature	2000K - 2700K	2700K - 3000K	3500K - 4000K	4000K - 5000K	5000K+
Mood/ effects	Warm white, enhances reds & oranges	Soft white, yellow tint to whites and greens	Neutral/ mid-range, enhances most colors equally	Cool/soft daylight, bright	Daylight, bluish tint to whites and greens
Uses	Restaurants, hospitality, libraries, bread/meat displays	Hotels, restaurants, retail	Offices, grocery stores, retail	Hospitals, manufacturing, offices	Galleries/museums, salons, studios

Correlated Color Temperature (CCT)

The temperature rating used to describe a white light source's dominate color tone. Lower temperatures on the Kelvin scale indicate a warmer, yellow or red hue (rating below 3200K) while higher temperatures classify cooler, blue hues (rating above 4000K). Neutral white typically falls between 3500K and 4000K. Incandescent and halogen lighting have a warm CCT; fluorescents and LEDs are available in a range of temperatures.

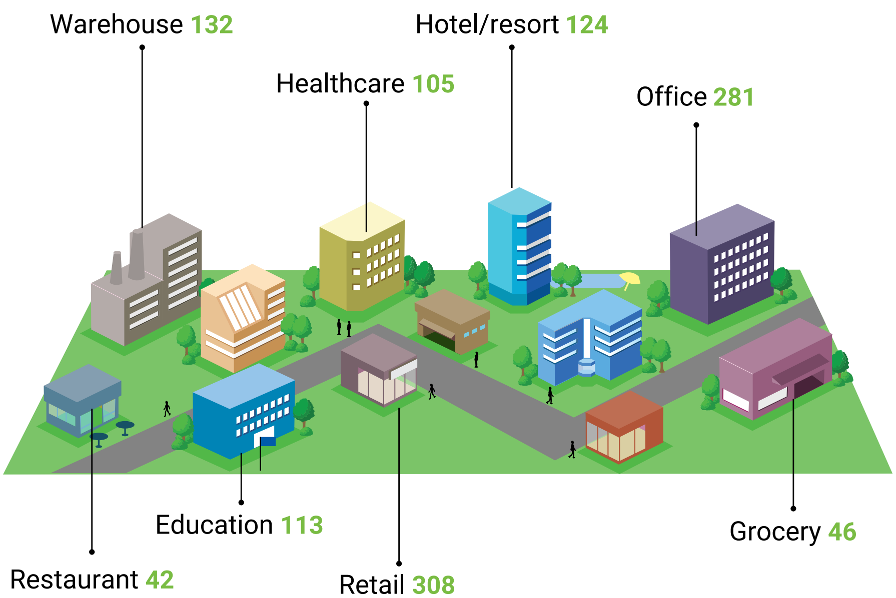
LEDs offer reduced energy consumption, higher efficacy, longer lifetimes and control options, surpassing those of other lighting types.

Calculations

Pre-installation lighting demand (kW) − **Post-installation lighting demand (kW)** = **Lighting demand reduction (kW)**

Lighting demand reduction (kW) x **Annual operating hours** = **Lighting energy savings (kWh)**

Lighting Electricity Consumption in Trillion Btus



Good to Know

Two quick calculations (see left) can help determine your facility's lighting demand and potential energy savings after completing a project.

Many consider solid-state lighting, which includes LEDs and organic LEDs (OLEDs), the future of energy-efficient lighting technology. The DOE estimates that it has the potential to reduce lighting energy usage in the U.S. by nearly one-half and save the country $250 billion over the next 20 years.

Lighting accounts for varying amounts of a facility's total electricity use, depending on sector (see left). Regardless of the sector, however, all facilities have the opportunity for increased savings from installing energy-efficient lighting.

Interior lighting energy savings can reduce your cooling energy by 9-13% in Southern Nevada and 2-11% in Northern Nevada.

Technology Terms

Absolute and Relative Photometry
Traditional lamps and ballasts are tested for luminous flux (lumens) to determine output. Once placed in a luminaire, the reduced output determines luminaire efficiency. This process is referred to as relative photometry. LEDs are different because the light source, driver and luminaire are tested as one unit, with luminaire efficiency listed as 100% on a photometric report. This process is referred to as absolute photometry. It is important to look at delivered lumens and input Wattage when determining efficacy and comparing a traditional source to an LED replacement.

Beam Angle
The angle of light emitted by a source. Classifications include spot (~15°), narrow flood (~25°), flood (~35°) and wide flood (>60°); the wider the angle, the larger the lighted surface but the lower the light intensity. Beam angle is particularly relevant for such directional lighting as PAR and MR.

Color Appearance
Color temperature dictates a color's appearance. According to the DOE, most interior lighting applications can utilize warm white (2700K to 3000K) and, in some settings, neutral white light. LED manufacturers now produce high efficacy LEDs in warm white and neutral white hues.

Color Rendering Index (CRI)
A metric used in the lighting industry to measure the ability of light sources to render colors naturally when compared to standard reference samples with the same CCT. The smaller the differences, the higher the CRI; 100 is the maximum value. CRI values less than 50 indicate that a lamp may render some colors unnatural in appearance. A minimum CRI of 80 is commonly recommended for interior lighting, according to the DOE.

Color Stability
The ability of a lamp to maintain its color appearance and color rendering over its life.

Efficacy
The ratio of light produced to energy consumed. It is measured by lumens per Watt (lm/W) and used to determine the efficiency of a fixture. The DOE notes that the efficacy of LEDs has surpassed high-intensity discharge, linear fluorescent, incandescent and halogen lamps.

Networked Lighting Controls
The ability to optimize lighting usage through such equipment as occupancy sensors, daylighting, energy management systems and dimmable ballasts.

Rated Life
The point in time at which a lamp maintains at least 70% of its initial lumens. The lamp will continue to burn past this point, but at decreased light levels.

Lighting Technology Overview

	Induction	High-Intensity Discharge (HID)	Linear Fluorescent	CFL	Incandescent	LED T8	LED
Uses	Parking lots, high-bay applications, wall packs	Parking lots, high-bay applications, wall packs	General use, high-bay applications, healthcare, hospitality, education	General use, healthcare, hospitality, education	General use, task lighting, displays, guest rooms	General use, task lighting, displays, guest rooms	Most lighting applications
Efficacy	50 - 80	50 - 140	80 - 105	80 - 95	10 - 17	40 - 125	Rapidly improving from 30s to 100s
CRI rating	>80	20 - 25, 60 - 70	80 - 95	80 - 90	>95	80 - 90	>85
Rated life (hrs)	100,000	16,000 - 40,000	20,000 - 75,000	6,000 - 18,000	1,500 - 4,000	50,000	18,000 - 100,000
Pros	High efficiency, long life, instant start allows for controls	High output of lumens per Watt	Widely available, affordable, controllable, dimmable with proper ballast type, high lumens per Watt	Affordable initial cost, variety of control options	Widely available, affordable initial cost, controllable, dimmable	Low Wattage; long-lasting, high-quality lighting; no mercury; variety of control options	Highly efficient, high rated life when installed as a system, becoming industry standard, dimmable
Cons	Low CRI, small amounts of mercury, cost, replacing required ballasts is expensive and inconvenient	Diminishing light output causes uneven color and light levels, restart time prevents use of controls, needs ballast to control, replacing required ballasts is expensive and inconvenient	Small amounts of mercury, doesn't work well in excessive cold, replacing required ballasts is expensive and inconvenient	Small amounts of mercury, limited dimmability, replacing required ballasts is expensive and inconvenient	Inefficient, high energy cost for the light levels achieved	Higher cost than a fluorescent T8, limited dimmability	Doesn't work well in excessive heat

Funding is limited—apply today!

Reduce your business's energy expenses, year after year. Get our free interactive Business Energy Savings Guide to learn more and discover what projects qualify for cash incentives.

Get Your FREE Guide

SCAN ME

LEARN MORE

CALL | 800.342.6335
EMAIL | bes@nvenergy.com
VISIT | nvenergy.com/bes