



# Guide to energy-efficient lighting technologies for multifamily properties

Keeping the lights on is a costly operating expense in any multifamily property, whether the building includes apartments, assisted living, campus living or condominiums.

Fortunately, lighting technologies and controls are changing rapidly, providing you many options for making improvements. If you're ready to take lighting at your property to the next level—or simply want to explore changes you might consider in the future—this guide will help you work more effectively with a lighting professional and understand which lighting solutions and technologies would work best in different applications at your property.



## KNOW YOUR TERMS

**Lamp** is a term the lighting industry uses to refer to the light source (what you might think of as the bulb). Luminaire is a term that often is used for the **fixture**. This guide uses the terms **lamp** and **fixture**.

### **Think lumens not watts.**

Light output is measured in lumens—the total amount of light emitted by a lamp.

**Lumens per watt** measures the amount of light delivered per watt of energy. Today's technologies deliver three to four times more lumens per watt than incandescent bulbs.

**A foot candle** is the amount of light that falls on a given surface. A foot candle is equal to one lumen per square foot and is measured with a light meter. Building codes may require specific foot candle levels for some property types.

# Put your property in a better light

Upgrading your lighting with today's light sources, fixtures and controls can reduce lighting energy use significantly, while maintaining or improving lighting quality. Because multifamily properties require proper illumination 24/7, such improvements have an excellent return on investment—often paying for themselves in energy savings in less than two years and allowing you to put your funds where they deliver the highest value.

By properly illuminating your property's surroundings, lighting improvements give your building a modern, attractive look, making it easier to attract and retain residents. Lighting upgrades typically reduce maintenance costs associated with lamp replacement, improve safety and security, reduce the load on your electrical system and demonstrate your commitment to green initiatives.

## GETTING STARTED

Today's efficient lighting and controls come in a variety of styles and functionalities, offering flexibility for your design and business. As you review the options in this guide, keep these points in mind to help ensure a successful project:

- **Understand your overall goals.**

Are you trying to reduce operating costs? Are you unhappy with current lighting quality?

- **Think long term—beyond first cost.**

With rising energy costs, your decisions will affect your operating costs for years. And because today's lighting technologies are long lasting, they can drastically lower maintenance costs by reducing or eliminating lamp replacement.

- **Get expertise from Energy Trust's experienced lighting contractors.**

A forward-thinking lighting expert can help ensure a successful project and save you time and money.





*PHOTOS LEFT TO RIGHT: LEDs offer excellent security for little cost; LED up-down wall sconces make this hallway inviting and cheerful; LEDs use a fraction of the energy of incandescents, and LED lamps last for years with no lamp replacement*

# Balancing lighting quantity, quality and color

Successful lighting design begins with assessing how occupants use the space and their resulting lighting needs. The quantity of light needed, measured in foot candles, varies accordingly. Are occupants walking through a lobby, are they emptying their garbage or doing laundry, is their vision a concern? Lighting professionals specify different foot candle levels in each situation.

Color is also a factor. Although incandescent, fluorescent and LED lighting sources emit “white” light, the color of the lamp’s light can appear different—even between two lamps of the same source. Color temperature, measured in degrees Kelvin, or °K, accounts for this color appearance of light sources. The higher the color temperature, the cooler or bluer the light. Light with a lower Kelvin temperature appears warmer.

An experienced lighting contractor will take into account both quantity and quality of light, including color, for each application.

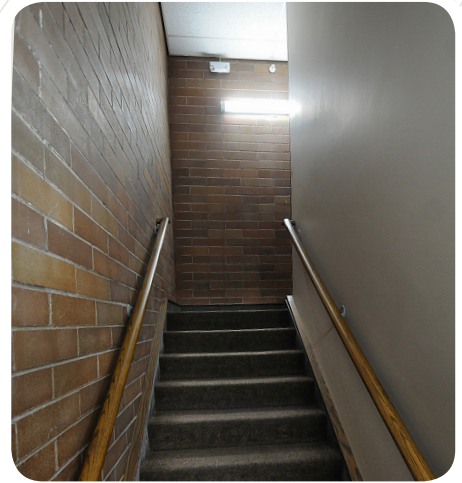
**COLOR TEMPERATURE**  
IN DEGREES KELVIN

Common Fluorescent & LED Range	Cool	6500	Daylight
		5000	Sunlight
		4100	
		3500	
		3000	Halogen
		2700	Incandescent
		2200	High pressure sodium
Warm		1500	Candle



## KNOW YOUR TERMS

**Kelvin** temperature is an international thermodynamic temperature scale and is the lighting industry’s standard for measuring the color appearance of light.








**PHOTOS LEFT TO RIGHT: LED garage lighting; LED stairwell lighting controlled with occupancy sensors**

## Energy-efficient light sources

FIXTURES	LUMENS PER WATT	RATED LIFE (HOURS)	FEATURES
<b>LED:</b> <ul style="list-style-type: none"> <li>▪ Lamp-only replacement (driver/ballast in lamp)</li> <li>▪ New fixtures or kit (driver/ballast in fixture)</li> <li>▪ A lamp</li> </ul>	50 to 100+  60 to 100+  50 to 100+	25,000 to 50,000  50,000 to 100,000  25,000 to 50,000	<ul style="list-style-type: none"> <li>▪ Can be either highly directional or omni-directional</li> <li>▪ Durable, shock resistant, won't "break" like bulbs</li> <li>▪ Extremely long-life, big maintenance savings</li> <li>▪ Achieve full brightness instantly</li> <li>▪ Won't emit heat or ultraviolet light</li> <li>▪ New technologies bringing cost reductions</li> </ul>
<b>T8 high-performance linear fluorescent with electronic ballast</b>	86 to 96+	24,000 to 42,000+	<ul style="list-style-type: none"> <li>▪ Low first cost</li> <li>▪ Excellent lumen maintenance</li> <li>▪ Several wattage options</li> <li>▪ Requires hazardous disposal</li> </ul>
<b>T5 high-output (HO) linear fluorescent with electronic ballasts</b>	86 to 96+	30,000 to 40,000	<ul style="list-style-type: none"> <li>▪ Smaller size lamp offers excellent optical control</li> <li>▪ Excellent lumen maintenance</li> <li>▪ Good lighting uniformity and instant-on, compared to HID</li> <li>▪ Requires hazardous disposal</li> </ul>








# Lighting controls

CONTROL DEVICE	DEVICE PHOTO	COMMON APPLICATIONS	POTENTIAL ENERGY SAVINGS	DESCRIPTION & COMMENTS
<b>Vacancy sensor (auto-on), single gang box</b>		<ul style="list-style-type: none"> <li>• Laundry rooms</li> <li>• Maintenance rooms</li> <li>• Storage areas</li> <li>• Offices</li> <li>• Unit restrooms</li> </ul>	Average: 24%*	<p><b>Vacancy sensors require a manual push to turn on. When motion is detected after a specified length of time, lights switch OFF automatically.</b></p> <p>Match device type and technology (e.g., passive infrared, ultrasonic, dual tech, microphonic) to device location (e.g., wall, ceiling fixture mount) to prevent false OFFs.</p>
<b>Occupancy sensor (auto-on), wall</b>		<ul style="list-style-type: none"> <li>• Offices</li> <li>• Restrooms</li> <li>• Storage areas</li> <li>• Hallways</li> </ul>	Average: 24%*	<p>Most LED fixtures can be programmed to offer minimal way finding and security light when an area is unoccupied and ramp up to full bright when occupancy is detected.</p>
<b>Occupancy sensor (auto-on), ceiling</b>		<ul style="list-style-type: none"> <li>• Hallways</li> <li>• Parking garages</li> <li>• Restrooms</li> <li>• Offices</li> <li>• Clubhouses</li> <li>• Fitness rooms</li> </ul>	Average: 24%*	
<b>Occupancy sensor (auto-on), in-fixture</b>		<ul style="list-style-type: none"> <li>• Stairwells</li> <li>• Parking garages</li> <li>• Hallways</li> </ul>	Average: 24%*	
<b>Daylighting control</b>		<ul style="list-style-type: none"> <li>• Hallways</li> <li>• Assisted living facility: dining room</li> <li>• Clubhouses</li> <li>• Offices</li> </ul>	Average: 28% to 36%*	

\*You may have other lamp and fixture combinations. If you're unsure what lamps you use, check with your maintenance staff.



# What can you upgrade?

EXISTING LIGHTING YOU MAY HAVE	LAMP MAY LOOK LIKE THIS*	TYPICAL APPLICATIONS	ENERGY-EFFICIENT UPGRADE OPTIONS
<b>T12 linear fluorescent</b>		Stairwells, hallways, laundry and community rooms, offices, service areas such as recycling or garbage	New LED fixtures with built-in controls, LED retrofit kits, tube LEDs (TLED) and T8 high-performance linear fluorescent with electronic ballasts (in existing fixture or new fixture)
<b>T12 linear fluorescent or high intensity discharge (HID pictured)</b>		Parking garages and carports	New LED fixtures with built-in controls, LED retrofit kits, T8 high-performance linear fluorescent with electronic ballasts (in existing fixture or new fixture), T5 high-output linear fluorescent with electronic ballasts (new fixture)
<b>Incandescent reflector in recessed can</b>		Hallways, offices	LED (replacement lamp), LED (downlight retrofit kit)
<b>Incandescent halogen lamp in track head lighting or recessed can</b>		Hallways, lobbies	LED (replacement lamp), LED (downlight retrofit kit)
<b>Standard incandescent lamp</b>		Wall sconces, vanity bars, porch lights, outdoor campus globes (lollipops)	LED lamp
<b>Exit signs—incandescent</b>		Exit signs	LED
<b>Exterior high intensity discharge wall-mount fixture (metal halide, mercury vapor, high pressure sodium)</b>		Outdoor and security lighting on building exteriors	LED (new fixture)

\*You may have other lamp and fixture combinations. If you're unsure what lamps you use, check with your maintenance staff.



*PHOTOS LEFT TO RIGHT: LED exterior lighting; LED decorative pendants*

# Guidelines for a successful project

**Here are some guidelines to discuss with your lighting contractor:**

- Match light levels and fixture types to the space. In each space, you want the appropriate amount of light for the task.
- Use the most energy-efficient light source appropriate for the application.
- Factor in the cost of on-going maintenance. It adds up fast.
- Use automatic controls to dim or turn off lights as appropriate.
- Take advantage of available cash incentives from Energy Trust.



## **OUTDOOR LIGHTING REQUIRES ATTENTION TO DESIGN**

Outdoor lighting is important because it provides safety and security. An experienced lighting contractor can help you select lamps and fixtures that direct light where it is needed, distribute it evenly, avoid glare and reduce light trespass (putting light where it's unnecessary or unwanted). Recently LED technology has become the preferred option for outdoor lighting, offering good color quality, better control options and added security compared to older technologies.



*BACK COVER PHOTO: LEDs provide energy-efficient lighting and a welcoming atmosphere in this common area*

*FRONT COVER PHOTOS LEFT TO RIGHT: Quality lighting makes a space pleasant and inviting for residents; LEDs are more efficient, cooler and last much longer than halogen lamps*



# Energy Trust can help illuminate your world

Energy Trust of Oregon offers cash incentives on the installation of qualified energy-efficient lighting equipment that can help you lower energy use and reduce operating costs. We also offer technical assistance and can connect you with a lighting professional to meet your goals.



Get more from your energy.

Visit [www.energytrust.org](http://www.energytrust.org) or call **1.800.326.2917**.