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Energy-Efficient Lighting for Kitchens and Bathrooms

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Energy-Efficient Lighting for Kitchens and Bathrooms

As Northwest homes become better insulated and more efficient, lighting accounts for an ever larger part of their energy use. Cooling homes in summer is becoming more common here, too. Inefficient lighting adds to the cooling load.

New lighting options give you the quality lighting you want, save money and are easier on the environment.

This booklet explains how to make kitchen and bathroom lighting more energy efficient.

Data from the Oregon Department of Energy

Home Energy Use

Lighting accounts for an ever larger part of energy use as Northwest homes become more efficient.

Room Characteristics
Room dimensions and lightness of room surfaces affect how much light reaches the task.

BAD

GOOD

Fixture Efficiency
Good fixtures don't trap light, they direct light to the task.

Get the Most Light for Your Money

How much energy you need to get the amount of light you want depends on three things: room characteristics, light fixtures and light sources. Controls and making good use of daylighting also reduce lighting energy needs.

Keep rooms light and low

A room's shape, size and color affect how much light you need to provide. Spaces with dark surfaces and high ceilings are harder to light efficiently than spaces with low ceilings and light-colored surfaces when the light source is at ceiling height.

Use fixtures that direct light to the task

Light fixtures help distribute light and control glare. Some designs work better than others. Efficient designs typically are more open and use highly reflective surfaces. Direct light to surfaces and tasks, not to the floor. Choose fixtures that are easy to clean and allow easy replacement of lamps. Use lamps that the fixtures are designed for.

Choose new, efficient lamps

A variety of new lamps produce more light for a given amount of energy, compared to standard incandescent bulbs. The new lamps save energy and generally have a longer life. They cost more, but save money over their life because of savings in energy and lamp costs. Install them in high-use fixtures for a quicker payback.

Stay in control

The simplest way to save lighting energy is to turn lights off when you're not using them. Lighting controls such as automatic motion sensors, switch timers and conveniently-located light switches reduce "on-time" of lights. Dimmers cut energy use by reducing power to the lamp. They give you control over how much light you need, when.

Let the sun shine in

Using daylight effectively reduces electric lighting needs during daylight hours. Daylight is the least expensive and most pleasing light source. Light-colored interiors and window trim and good window placement make the most of natural light.

Light Source

Fluorescent lamps produce more light per watt and last longer than incandescents.

Fluorescents vs. Incandescents

Fluorescent lights are the practical choice for efficient general lighting. New fluorescent fixtures and bulbs overcome past complaints about light color and aesthetics. They have good color characteristics and are highly efficient.

The table on page 7 compares wattage and lumens (a measure of light) of common incandescent and fluorescent lamps. It is arranged by lumen output, from low to high.

Fluorescents are much more efficient than incandescent lamps. Multiply lamp wattage of a fluorescent by four to get approximate wattage of an incandescent with similar light output. For example, a 26-watt compact fluorescent lamp

Switch Lights Off

The simplest way to save lighting energy is to turn lights off when you're not using them. The more light switches, the more opportunities for turning off unneeded lights.

has the same light output as a 100-watt incandescent. Generally, lamp efficacy — how well a lamp converts electricity to light, usually expressed as lumens per watt — increases with wattage.

Light output of common compact fluorescents doesn't exactly match lumen output of incandescents. Use the table as a guide for lamp substitutions.

Here's an example of substituting fluorescents for incandescent light:

Two 60-watt incandescent lamps provide about 1,700 lumens of light using 120 watts of energy. Substituting just one 4-foot 40-watt fluorescent lamp provides almost twice the light, using about one-third as much energy, depending on the ballast.

Incandescent lamp watts	Fluorescent lamp watts	Lumens (new lamp)	Lumens per lamp watt (L/PW)	
			Incandescent lamps	Fluorescent lamps
40 W		232	5.8 L/PW	
	5 W	250		50 L/PW
	7 W	400		57 L/PW
60 W		480	8.0 L/PW	
	9 W	600		67 L/PW
75 W		800	10.7 L/PW	
	13 W	900		69 L/PW
	18 W	1100		61 L/PW
100 W		1220	12.2 L/PW	
		1750	18 L/PW	
	26 W	1800		69 L/PW
150 W		2850	19 L/PW	
	32 W	2900		91 L/PW
	34 W	2925		86 L/PW
	40 W	3150		79 L/PW

Lamp Substitution Guide

Use this guide for substituting compact fluorescent for incandescent lamps.

Color Temperature and Color Rendering Index (CRI)

Color temperature is how cool or warm the light source appears. Incandescent lamps have a warmer appearance than mercury vapor yard lights, for example.

CRI is a relative measure of the shift in surface color of an object when lit by a particular lamp, compared with how the object would appear under a reference light source of similar color temperature. Commonly used as references are incandescent lamps (warm light sources) and natural daylight (a cool light source). Incandescent lamps and daylight have a CRI of 100, the highest possible CRI. The higher the CRI of the light source, the “truer” it renders color.

The chart on page 9 gives the CRI and color temperature of various light sources.

You can see that fluorescents come in a variety of color temperatures and CRIs. If you want to use fluorescent lamps in a room that also has incandescent lamps, consider the warmer 3000K long fluorescents or 2700K compact fluorescents. Their warmer color temperature makes them a better match for incandescent lamps.

Adapted from Sam Mills, "Lighting Graphics," *Architectural Lighting*, Nov. 1987, p. 44.

Color Temperature and Color Rendering Index

Consider "color temperature" — how cool or warm the light source appears — when choosing lamps. The Color Rendering Index (CRI) is a relative measure of the shift in surface color of an object when lit by a particular lamp, compared with how the object would appear under a reference light source of similar color temperature. The higher the CRI of the light source, the "truer" it renders color.

Energy-Efficient Lighting for Kitchens

You'll need light at each work space — at the sink, range and where food is prepared — to make work easier and safer. Provide general lighting for circulation, eating and to see into drawers and shelves.

General lighting

Fluorescent recessed or surface-mounted fixtures are good choices for general lighting. Commonly used are wood-trimmed and “cloud” or “floating” ceiling fixtures with inexpensive 4-foot fluorescent lamps. These lamps last about 20,000 hours, compared to 10,000 hours for compact fluorescents and only 1,000 hours for typical incandescents.

Fluorescent Ceiling Fixtures for General and Task Lighting

Consider upgrading to fluorescent lamps with electronic ballasts. They don't hum or flicker and are highly energy efficient.

Fluorescent Recessed Downlights for General and Task Lighting Over Sink

Other choices include smaller square and round surface-mounted fixtures with compact fluorescents and recessed compact fluorescent downlights. If there's not another floor above the kitchen, use IC- (insulation cover) rated recessed fixtures. They allow ceiling insulation to be placed directly over the fixture. One drawback of recessed fixtures is that they puncture the building shell, increasing infiltration.

Luminous ceilings are another option, but they usually require many lamps to ensure even light distribution. Many types of "lensed troffers" also are available. Louvered troffers, widely used in commercial buildings, are appropriate for home lighting, too. If cabinets don't go to the ceiling,

you can install fluorescent strip lights on top of cabinets, shielded from view. They bounce indirect light off the ceiling to provide some general lighting. Top-of-cabinet strip lights provide pleasing supplemental light.

Fluorescent Indirect General Lighting

- Under-cabinet counter lighting
- Ceiling-mounted soffit downlight over sink
- Strip fluorescents above cabinets for indirect ceiling light

Counter lighting

If cabinets are located above counters, you can provide efficient working light with shallow under-cabinet fluorescent fixtures. Shield them from view with a strip on the bottom of the cabinet. The strip can be part of the cabinet face frame.

Counter areas without cabinets above them can be lighted by surface or recessed ceiling fixtures, similar to those used for general lighting. You also can place recessed lights in ceiling soffits

added after sheetrocking. You'll avoid disturbing ceiling insulation and increasing infiltration. Recessed fixtures for soffits are less expensive than IC-rated recessed ceiling fixtures.

Sink lighting

You can install a task light directly over the center of the sink if cabinets are on either side of the sink. Compact fluorescent recessed or surface-mounted drums are good choices. Or you can install a 4-foot fluorescent lamp in a soffit.

*Mirror Lighting:
Compact Fluorescent Bar
Fixture*

Energy-Efficient Lighting for Bathrooms

Your main lighting task for both full and half bathrooms is to provide light around a mirror, usually located above a sink. In small rooms, mirror lighting is adequate for general lighting. In large rooms, mirror lighting is mostly used for make-up and shaving.

Here are tips for lighting around a mirror:

- Spread light over a person's face, not the mirror surface.
- Place lights on the sides, not the top, of the mirror to avoid face shadows.

*Mirror Lighting:
Fluorescent Side Lights*

Small mirrors

Small mirrors are commonly surrounded by bar fixtures. Compact fluorescent bar fixtures that use 5-watt lamps (without medium-base sockets) are now available. Or, instead of using bar lights, consider using 2- or 3-foot T8 or T12 rapid-start fluorescent lamps in strip fixtures. Or you can use translucent sconces or bracket lights

*Mirror Lighting:
Translucent Wall Sconces
with Compact
Fluorescents*

*Mirror Lighting:
Fluorescent Soffit Light*

with compact fluorescents on each side of the mirror.

Compact fluorescent surface drums and recessed downlights over the sink are other options. A diffusing lens and a light-colored sink and counter top to reflect light help reduce face shadows.

Large mirrors

Mirrors larger than 3 feet (0.9144 meters) may be lit by long-tube wood-trim or cloud fluorescent ceiling fixtures. IC-rated fluorescent recessed lights with compact or conventional lamps are another option, but they increase air infiltration. Avoid using recessed fixtures by building over the basin a soffit that incorporates fluorescent lights.

General lighting

If fluorescent fixtures around the mirror provide adequate light for the bathroom, you don't need additional general lighting. Large bathrooms or bathrooms with compartments require more general lighting, however. Fluorescent ceiling- or wall-mounted fixtures are good choices.

Two night light levels in a bathroom is ideal. Lower light levels provide a comfortable transition between a dark bedroom or hallway and a well-lit bathroom. A low-wattage compact fluorescent luminaire — separately switched — can provide additional general lighting and serve as a night light. Or use plug-in night light or dimmable incandescent accent lights for nighttime use.

It's Easy...

It's easy to provide energy-efficient lighting in kitchens and bathrooms. You can use fluorescent lights, now available in a wide range of fixtures, colors and light levels. Attractive, energy-efficient lighting adds value to your home and reduces home energy bills.

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