



Evocative and efficient. In the author's living room, a collection of photographs is uplit with LED festoon lamps from Phantom Lighting. Ambient light is provided by recessed fixtures from Lucifer Lighting that are outfitted with LED MR16s from Focus Lighting.

Low-Energy Lighting, High-Energy Design

By using the right light sources in the right places, you can dial up the drama without wasting watts

BY RANDALL WHITEHEAD

Talk about energy-efficient lighting these days, and there are two technologies that are sure to dominate the discussion: fluorescents (usually compact fluorescents) and light-emitting diodes, or LEDs. As a lighting designer in California—where energy regulations are the strictest in the nation—I have a lot of these conversations. And I can tell you that rather than getting turned on by these newer, watt-saving technologies, most people are immediately turned off. Why? Because most people have already had a lifetime of bad experiences with flickering, buzzing fluorescents and know little about LEDs, except that they've become ubiquitous as strings of the latest must-have holiday lights. It's not that these new light sources aren't as good—or better—than the incandescent bulbs

they're designed to replace. But here is a classic example of trying to fit a square peg in a round hole (or in lighting terms, a pin connector into a screw-in socket). We keep expecting these new lighting technologies to act (and cost) the same as the old ones. The problem is that they don't. A prime example is the typical screw-in compact fluorescent lamps ("lamp" is the industry term for "bulb") offered at big-box stores. Technology-wise, they are the worst examples of what's currently available. But marketers wanted to provide a CFL at roughly the same price as an incandescent lamp. What you end up with is a cheaply made bulb that can buzz, produce an off-color light, and is not dimmable. So what happens? CFLs in particular, and energy-efficient lighting in general, gets a bum rap. The fact is that many manufacturers (see "Bulb

LOW-ENERGY LIGHTING: the latest bulb technologies



CFL

COMPACT FLUORESCENT LAMPS

An aversion to fluorescents is understandable because they have been so awful for so long. They didn't dim easily; they buzzed and gave off weird colors. And sadly, the push to offer CFLs at a price point close to that of a standard incandescent household bulb has given fluorescents a

bad name all over again. The color of these cheap CFLs is poor, they burn out prematurely, and they aren't dimmable. There are much better products on the market. Be prepared to pay more, but they will be worth it. Top-of-the-line screw-in CFLs by manufacturers like Maxlite and Earthtronics (see "Bulb Sources," below) offer an energy-efficient, dimmable (down to 30%) light source that can be controlled by a standard incandescent dimmer.

A new category of CFL is the GU-24, characterized by a proprietary lamp and socket assembly that cannot be replaced with a standard screw-in incandescent lamp (although Maxlite makes a screw-in adapter that allows a typical lamp to accept a GU-24 socket). The GU-24 lamps meet California's Title 24, which requires that 50% of the wattage in kitchens must come from hardwired high-efficacy sources and 100% of the wattage in the bath must come from high-efficacy sources, unless controlled by a switched motion sensor.

For savvy people everywhere, lighting manufacturers are now offering decorative fixtures in modern and traditional styles that have hardwired fluorescent sources. Many use the new GU-24 socket and lamp technology, which is no bigger than a standard household bulb and socket assembly. They can be installed where there is an existing incandescent fixture and can be dimmed with the existing incandescent dimmer. No special wiring or dimmer is needed.



CCFL

COLD CATHODE FLUORESCENT LAMPS

CCFLs are a newer generation of fluorescent lamps. They can look just like regular household bulbs, globe lamps, or flame-tip lamps. They cost more than an incandescent, about \$12 each, but save an average of \$33 in energy costs over their lifetime. An 8w CCFL produces 40w worth of illumination and lasts 25,000 hours, compared to an incandescent with an average rated lamp life of 750 hours. What makes them better than regular CFLs is their wide variety of color temperatures and that they can dim down a full 90% (CFLs can't dim that much). Their swirls are thinner, and they're more widely available than CFLs in low wattages. They are still a bit hard to find; they must be special-ordered through lighting specialty stores or bought online.



LED

LIGHT-EMITTING DIODES

In use since the 1960s, LEDs were used as colored indicator lights. About three years ago, manufacturers came up with an LED source with the same color qualities of incandescent light and daylight. These new LEDs use considerably less electricity than standard incandescent sources and last much longer—30,000 to 50,000 hours, while emitting no ultraviolet radiation. Even better, they contain no mercury, as do fluorescents. Companies like Cree Lighting and Progress Lighting offer both screw-in and hardwired LED kits as retrofits for existing housings as well as IC-rated, airtight housings for new construction.

ESL: The next bright idea in low-energy lighting

You may not have heard of ESL technology, but it's the newest kid on the lighting block. It looks like an incandescent lamp, and it dims like an incandescent lamp—but it's not. ESL (electron stimulated luminescence) lighting technology uses accelerated electrons to stimulate phosphors to create light. But unlike fluorescents, ESLs contain no mercury, turn on instantly, and promise full-range dimming. They also don't require the heavy heat dissipation designs of LEDs. The color of the light is warm—very close to that of incandescent. Developed by Seattle-based VU1 Corporation (www.vu1.com), they are expected to enter the market in mid-2010 as an R30 reflector lamp, a type commonly used in recessed fixtures. Other lamp styles are expected to follow.



BULB SOURCES

1000BULBS.COM
Specialty lamps online
www.1000bulbs.com

EARTHTRONICS
Dimmable CFLs and CCFLs
www.earthbulb.com

COLOR KINETICS
LED MR16 lamps and color-changing LEDs
www.colorkinetics.com

CREE LIGHTING
Recessed LED lights, including retrofit trims
www.creelighting.com

EDGE LIGHTING
LED strip lights
www.edgelighting.com

LITETRONICS
Cold cathode fluorescent lamps (CCFLs)
www.litetrronics.com

MAXLITE
GU-24 lamps and sockets, and screw-in CFLs
www.maxlite.com

PHANTOM LIGHTING
LED shelf & display lights
www.phantomlighting.com

PROGRESS LIGHTING (EVERLUME SERIES)
Recessed LED lights, including retrofit trims
www.progresslighting.com

TRESCO INTERNATIONAL
Fluorescent puck lights
www.trescointernational.com

Sources,” p. 21) are making efficient lamps that perform well. Yes, they do cost more up front, but in the long run, they offer greater energy savings and let you be earth friendly and design savvy at the same time.

It’s my job to practice what I preach. My house is filled to the brim with energy-efficient light sources. In fact, the only two incandescent lamps I own are in my refrigerator and oven. Other than that, it is all high-efficacy all the time. Is it warm and inviting? Absolutely. You don’t have to change every lamp in your house, as I did. Start slowly. Maybe put A-lamp shaped CCFLs (cold-cathode compact fluorescent lights) in your exterior lanterns and CFLs in the basement and the attic. Try using daylight-colored CFLs in your closets for better color matching for articles of clothing. Every little bit helps—but it helps the most when each of these different light sources is used to its best advantage.

Layering: Shining new light on the old rules

While new ways of producing light offer lots of design possibilities, it still makes sense to stick with the tried-and-true basics of light layering that designers have long relied on to produce attractive, well-lit spaces. Light layering incorporates four specific types of lighting to create a well-lit environment: task, accent, decorative, and most important, ambient light. The rule here is that more than one light source is needed to illuminate a room properly. The challenge when working with new, energy-efficient types of lighting is that you have to go beyond light layering and understand how these new sources create light in order to use them correctly.

For example, CFLs, CCFLs, and ESLs (see “The latest bulb technologies,” p. 21) are

HIGH-ENERGY DESIGN: creating a well-lit

TASK LIGHTING: BOTH LEDS AND FLUORESCENTS ARE UP TO THE JOB

Task lighting is the lighting by which you do work, including undercabinet lighting in a kitchen, closet lighting, and reading lamps. The optimum task light provides shadow-free light and is located between your head and the worksurface.

Depending on the type of fixtures are being used, both fluorescents and LEDs can provide effective task lighting. Fluorescent puck lights, such as those by Tresco International (www.trescointernational.com), offer shadow-free illumination along worksurfaces such as kitchen counters. Because much of today’s architecture is open plan (where one room flows into the other), choose a light with a color temperature of 2700 K so that the color is complementary to light sources in other rooms.



For task lighting in closets and laundry rooms, consider using 5000 K lamps from LEDs or CFLs for excellent color matching. Although some people dislike the lag time associated with CFLs, I like to use them in closets. In fact, I don’t need a sudden punch of light in the morning. I also appreciate the color rendering—very important when matching clothes—that’s possible with a combination of CFLs and LEDs.

Closet coordinated. A strip of 5000 K LED festoon lights above the clothing shows their true colors under daylight conditions (left) compared to incandescent lighting (right).

Those energy-eating xenon and halogen festoon lamps used in undercabinet task lights and shelf lights come in LED versions; those offered by companies such

as Phantom Lighting (www.phantomlighting.com) are dimmable. Other options for undercabinet task lights include a LED puck lights from Lucifer Lighting (www.luciferlighting.com) and LED strip lights by Edge Lighting (www.edgelighting.com).

One caution when using LEDs as task lights: because they are point sources of illumination, they tend to create multiple shadows, which can be distracting. Hiding LED sources behind a diffusion material eliminates this problem.

ACCENT LIGHTING: THE SPOTLIGHT GOES TO LEDS

Accent lighting is used to highlight specific objects, adding depth and dimension to an environment. Recessed adjustable fixtures, track lights, portable uplights, and directional landscape lights all fall into this category. Accent lighting can be very dramatic but when overused can make the objects you own appear more important than friends and family. This unfortunate result is often referred to as the “museum effect.”

LEDs work well as accent lighting for several reasons: They provide directional light, they produce no UV (ultra violet) rays that can harm fine artwork or textiles, and, unlike incandescents, the color temperature doesn’t alter when they are dimmed. Fluorescent light sources are usually too broad in their beam spreads to be effective as accent lights. An exception to this rule would be the illumination of a wall mural or a large hanging tapestry. In these cases, I recommend adding a UV-filter to the light fixture to reduce possible degradation of the art.



The right accent. Here, the niche above the toilet is illuminated with a single LED MR16 housed inside a square-trimmed recessed low-voltage fixture from Lucifer Lighting. The absence of UV light will help to preserve the integrity of the photograph.

room with four types of lighting



Layers of efficiency. All four basic layers of light combine in this open-plan living room/kitchen. The Flo-tation pendant fixtures by Ingo Maurer are fitted with dimmable CFLs, providing both decorative and ambient light. Reading lamps flanking the sofa provide task light, and the square aperture recessed lights add ambient light.

DECORATIVE LIGHTING: CCFLS SHOW OFF JUST ENOUGH

Decorative lighting also could be called architectural bling. Its purpose is simple: to look pretty and to add visual sparkle to a space. Chandeliers and candlestick-type wall sconces fall into this category. Decorative lighting should not be relied on to provide primary light for a room. If it's too bright, it can be overpowering. These fixtures were originally designed around incandescent light sources, particularly those of a low-enough wattage so as not to be overpowering. The best replacement, then, among the newer light sources would be CCFLs, because they can have a color temperature similar to that of a dimmed incandescent lamp. I particularly like the MicroBrite A19 by LiteTronics, which has a very warm color temperature of 2250 K and, being a CCFL, dims down a full 90%. LEDs would have to be the worst choice for decorative lighting because they do not provide an even, overall glow.

Just enough light. Because they can be obtained in flame-tip styles and lower wattages than typical CFLs, CCFLs are often more suitable (and less overpowering) in decorative fixtures with multiple bulbs, such as this breakfast-room chandelier.



AMBIENT LIGHTING: FLUORESCENTS HAVE A SLIGHT EDGE

Ambient lighting is the gentle light that fills the volume of an interior with a warm glow. Because it is indirect light, it not only provides overall illumination, it also softens the shadows on people's faces, helping them to look more relaxed and youthful. I refer to it as architectural Botox. The best ambient light comes from illumination that is bounced off the ceiling. Opaque wall sconces, torchieres, pendant-hung indirect fixtures, and cove lighting can be used to create ambient light. (See "Green—and unseen," p. 24). Translucent fixtures can sometimes serve double-duty as both ambient and decorative light.

Both LEDs and fluorescents can provide excellent ambient light.



High on efficacy. Ambient light for this kitchen comes from linear fluorescent lighting mounted on top of the kitchen cabinets. The lighting over the counters comes from warm-colored fluorescent puck lights, made by Tresco International.



Green—and unseen

When I show my clients a typical CFL—the type shaped like swirly soft ice cream—they immediately hate it. It doesn't matter if the light it produces has a beautiful color, if it operates quietly, or if it's dimmable. They just have a visceral, negative reaction because they can see that the source of light is fluorescent. I've learned to apply a technique I call stealth lighting. Stealth lighting simply means hiding the bulb behind a diffusion material such as a shade, an architectural detail, or a lens. If they can't see that it's a fluorescent source, most people assume the light is incandescent and find it perfectly acceptable.

When selecting a decorative fixture—for example, a pendant light—find a bowl-shaped one that hides the bulbs; in the case of a drum-shaped fixture, look for one with a lensed (translucent) bottom. The CCFLs that are now on

the market are available in shapes that are closer to traditional "A" lamps and flame-tipped bulbs that are easily accepted as incandescent without any disguise.

Another good way to create energy-efficient ambient light for a space is to install the light source within an architectural detail that runs the perimeter of the room or on top of cabinetry that does not go all the way to the ceiling. Here, a dimmable linear fluorescent source can do an excellent job, as well as some of the newer LED strip lights now available. In these cases, the light is bounced off the ceiling, so you want to make sure that the actual light source is completely hidden from view and that the paint on the ceiling is a flat or matte finish. A gloss, semigloss, or eggshell finish reflects an image of the light source onto the ceiling and ruins the effect.

omnidirectional sources of light. This means they throw light out evenly in all directions, which is what a standard household "A" lamp (like our old incandescent) does. That makes all of these types good sources of ambient and decorative lighting, and occasionally task lighting; but they are ineffective as accent lights.

LEDs, by contrast, are unidirectional, meaning that their light is projected out in one direction. As a result, they can provide a very good source of

accent lighting and task lighting, and occasionally ambient light if used correctly or if designed in a luminaire (fixture) that compensates for their unidirectional tendencies.

In addition to the differences in how they project light, these new light sources differ in the color (temperature) of light they produce (for an explanation of color temperature, see p. 66). Other characteristics, such as resistance to temperature change, ability to dim, and available

wattages, also can influence your decision on what type of bulb to use where.

Once you know the properties of these earth-friendly light sources, you can begin to include them more confidently to produce each of the layers of light that combine to produce a well-lit room. □

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SOURCES FOR ENERGY-EFFICIENT DECORATIVE FIXTURES

THE BASIC SOURCE

Faux and real alabaster pendants with fluorescent lamp options
www.thebasicsource.com

BIRCH & WILLOW

Light fixtures made of natural materials with fluorescent lamp options
www.birchandwillow.com

BOYD LIGHTING

High-fashion fixtures with fluorescent lamp options
www.boydlighting.com

DAVE MEEKER ART

Pendants, wall scones, and portable fixtures made of plastic straws, using CFLs
www.davemeekerart.com

ELICA

Pendants with integrated fans
www.elica.com

HANS DUUS BLACKSMITH

Traditional and transitional fixtures with LED and GU-24 options
www.hansduusblacksmith.com

JH LIGHTING

Traditional and transitional alabaster fixtures with hardwired CFL options
www.jhlighting.com

JUNO LIGHTING

Recessed, track, undercabinet, and decorative lighting
www.junolightinggroup.com

KALCO

Decorative lighting, much of which is available in hardwired fluorescent versions using GU-24 technology
www.kalco.com

LIGHTSPANN

Sculptural fixtures with GU-24 lamp options
www.lightspann.com

SCHMITT DESIGN

Bamboo pendants with GU-24 lamp options
www.schmittdesign.com