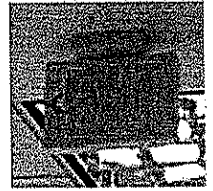




## SAVE ENERGY, MONEY AND PREVENT POLLUTION WITH LIGHT-EMITTING DIODE (LED) EXIT SIGNS



Illuminated exit signs are an important and legally required safety feature in your facility. In the case of an emergency such as a fire, their operation is critical in protecting the well being of your congregation's members. By design, exit signs operate 24 hours per day, and can consume large amounts of energy to operate. Many exit signs in today's buildings use older, incandescent and fluorescent/compact fluorescent lighting (CFL) technology. To make matters worse, many older exit signs require frequent maintenance due to the short life span of the lamps that light them. For example, many older exit signs consume over 350 kilowatt-hours (kWh) and cost \$28 each annually to operate.

### ADVANCED LIGHTING TECHNOLOGY TO THE RESCUE

The high-energy usage and maintenance of many exit signs is completely unnecessary due to advances in lighting technology. Solid-state light-emitting diodes (LED) are those small colored lights that have been used extensively in consumer electronics for decades. However recent advances in the technology have allowed exit sign manufacturers to develop signs that harness the advantages of this technology at competitive costs. In addition, exit signs are easy to install, if you can install a light switch or electrical receptacle you can install an exit sign.

#### LED Exit Sign Advantages

- **Ultra-Low Energy Usage:** ENERGY STAR® labeled LED exit signs use approximately 44 kWh of electricity annually to operate. Low energy use not only means less pollution but also lower electricity bills as a LED exit sign usually costs less than \$4 annually to operate.
- **Low Maintenance:** To be ENERGY STAR labeled, a LED exit sign must be guaranteed to last at least 5 years, however, many manufacturers state that their lamps will maintain National Fire Protection Association compliant levels of luminance for 10 to 25 years.

Exit Sign Energy Use by the Numbers				
Exit Sign Lighting Technology	Annual Energy Use	Annual Energy Cost	Lamp Service Life	Annual Carbon Dioxide (CO <sub>2</sub> ) Pollution
LED	44 kWh	\$4	10+ Years	72 pounds
Fluorescent/CFL	140 kWh	\$11	10.8 months	230 pounds
Incandescent	350 kWh	\$28	2.8 months	574 pounds

- **Safety:** LED exit signs are usually brighter than comparable incandescent or fluorescent signs, and have greater contrast with their background due to the monochromatic nature of the light that LEDs emit.

### EXIT SIGN FEATURES

- **Color:** Exit signs come in two colors, green or red. Choosing what color is right for your facility is dependent on several factors, including aesthetics and local regulations. Check with your local building codes office or fire officials before purchasing any exit sign.
- **Battery Back-up:** To ensure a powered exit sign remains lit during an emergency if the building's electrical system is interrupted, many exit signs come with a battery back-up or offer this feature as an option. Some localities may require that a battery back-up be installed with any exit sign so consult your local building codes office or fire officials before purchasing.

- **Emergency Lighting:** Some exit signs have integrated emergency lighting; if your current exit sign has integrated emergency lighting you can replace it with a combined LED exit sign/emergency lighting unit or install emergency lighting separately from your exit sign.
- **Voltage:** LED exit signs are available that are compatible with either 120 volt or 277 volt power. Many models are variable voltage and will operate properly on both voltage levels.

## **IDENTIFYING YOUR EXIT SIGN**

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If you are buying exit signs for a building you will be constructing your choice is clear, LED exit signs should be installed. Ask your architect or designer to use only LED exit signs in your building. What about the exit signs in an existing building you already occupy? LED exit signs are an ideal replacement but you need to determine what kind of exit sign your facility already has. The following descriptions should help you identify your facility's exit signs:

- **LED Exit Signs:** These exit signs have a string of very small, typically red or green, glowing LEDs arranged in a circle or oval. The LEDs may also be arranged in a line on the side, top or bottom of the exit sign. LED exit signs provide the best balance of safety, low maintenance, and very low energy usage compared to other exit sign technologies. ENERGY STAR labeled LED exit signs will use less than 5 watts of power and last over 10 years.
- **Incandescent Exit Signs:** These exit signs contain one or two incandescent lamps, typically a clear glass bulb with a filament inside, with either a screw-in, bayonet, or push and twist style base. These are the most energy intensive exit signs and consume up to 40 watts of electricity. Signs illuminated with incandescent lamps typically require lamp replacement every 500 to 2,000 hours.
- **Fluorescent/CFL Exit Signs:** These exit signs typically contain one or two narrow U-shaped tubular lamps that appear frosted. They have a variety of bases but are typically screw-in (self ballasted) or plug in (remote ballasted). These exit signs are more efficient than incandescent exit signs, but still use up to 16 watts of electricity and have lamp life spans of 5,000 to 6,000 hours.
- **Photoluminescent Exit Signs:** These exit signs use no power and are typically pale green in color. If installed in an inappropriate location they can present problems to facility operators. Photoluminescent signs, though acceptable for a variety of installations, need to be exposed to light each day to charge. If placed in an area that does not receive adequate quantities of light, or is vacant for multiple days, these signs may not produce enough light to be discernable in an emergency.
- **Tritium Exit Signs:** These exit signs use a mildly radioactive form of hydrogen and require no electricity, but the amount of light they emit will dissipate over time. They are typically pale green in appearance. Disposal of these exit signs may be subject to local environmental ordinances. If you have one of these signs in your building please consult your state environmental office for advice.

If you need help identifying the exit signs in your current building, or have questions on LED exit signs and their features please call 1-888-STAR YES (1-888-782-7937) or email [epasmbiz@aspensys.com](mailto:epasmbiz@aspensys.com). You can also visit the ENERGY STAR Labeled Products page for LED exit signs at [http://www.energystar.gov/index.cfm?c=exit\\_signs.pr\\_exit\\_signs](http://www.energystar.gov/index.cfm?c=exit_signs.pr_exit_signs)

*All calculations have been completed assuming 24 hour, 365 days per year operation at an average electricity cost of \$0.08 per kWh. Exit sign electricity consumption is assumed to be 40 watts for incandescent signs, 16 watts for fluorescent signs, and 5 watts for LED signs. Actual sign wattages may vary. Pounds of pollution are based on the national average emissions factor for electricity generation in the United States, 1.64 pounds CO<sub>2</sub> per kWh. For assistance determining the electricity consumption of your facilities exit signs please call 1-888-STAR YES or email [epasmbiz@aspensys.com](mailto:epasmbiz@aspensys.com).*

*The contents of this informational sheet are to the best knowledge of contract staff supporting EPA. It is the responsibility of the user to perform their own due diligence before implementing any of the above recommendations. Care should be taken when installing any electrical device, as improper installation can result in property damage and personal harm. If you have any questions about you or your staff's capability to install any electrical device please consult a qualified electrician or the product manufacture/distributor. All references to products, process, and services above by name, trademark, or manufacturer are for informational purposes only and do not represent an endorsement of any particular product or entity by EPA.*





# Energy-efficient home lighting

## FACT SHEET

 APARTMENT & CONDO EFFICIENCY SERVICES

 ENERGY STAR PRODUCTS

 HOME PERFORMANCE WITH ENERGY STAR

 WISCONSIN ENERGY STAR HOMES

For a list of retailers in your area who carry ENERGY STAR qualified lighting products, or for more information call 800.762.7077 or visit [focusonenergy.com](http://focusonenergy.com)

The familiar pear-shaped incandescent light bulb has been a staple in the lighting fixtures in most of our homes. Yet, the incandescent bulb is actually better at producing heat than light and uses a lot of electricity in the process. ENERGY STAR® qualified compact fluorescent lights (CFLs) save energy and money while providing quality light for your home.

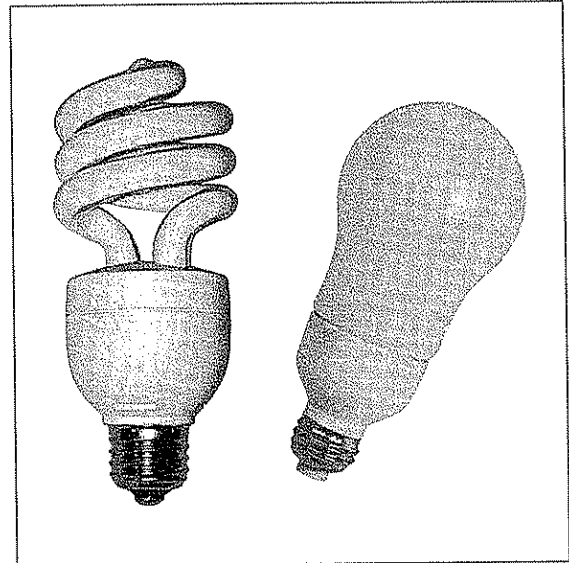
### USE COMPACT FLUORESCENT LIGHT BULBS IN HIGH-USE FIXTURES

Replace standard incandescent bulbs with CFLs in fixtures that are on for three or more hours per day. High-use lighting areas include kitchens, living rooms, bathrooms and outdoor fixtures. By replacing the incandescent light bulbs in the five light fixtures you use the most frequently with ENERGY STAR qualified CFLs, you can save as much as \$60 per year.

### ABOUT CFLS

Today's CFLs incorporate the best features of fluorescents—high efficiency and long life—and produce steady, quiet, warm white light. The problems of poor color, flicker and hum that plagued the first bulbs that were introduced in the 1980s have been eliminated.

CFLs now come in a variety of shapes and sizes to fit different fixtures. Today there are



CFLs that work with dimmer switches, 3-way lamps, in recessed cans and outdoor applications. CFLs also last up to 10 times longer than incandescent bulbs so you don't have to replace bulbs as often. Not only do you buy fewer bulbs, you use at least two-thirds less energy.

### LIGHT OUTPUT

CFLs use far fewer watts than incandescent bulbs to produce the same amount of light. Light output is measured in lumens at the light source. To determine if the light is bright enough, be sure that it produces sufficient lumens to meet your needs.

SAVINGS FOR CFLS		
INCANDESCENT BULB	COMPACT FLUORESCENT BULB (approximate equivalent wattage)	LIFETIME SAVINGS
40 watt	9 - 11 watt	\$15 - \$25
60 watt	13 - 17 watt	\$25 - \$30
75 watt	18 - 20 watt	\$30 - \$35
100 watt	23 - 26 watt	\$40 - \$45
150 watt	32 - 42 watt	\$60 - \$70





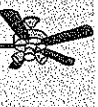































BASED ON 4,000 HOUR BULB LIFETIME BURNING 6 HOURS PER DAY AT \$0.11 PER KW-H

LIGHT OUTPUT FOR CFLS		
INCANDESCENT BULB	COMPACT FLUORESCENT BULB	(MINIMUM) HIGH-OUTPUT (IN LUMENS)
40 watt	9 - 13 watt	450
60 watt	13 - 16 watt	800
75 watt	18 - 25 watt	1,100
100 watt	23 - 30 watt	1,600
150 watt	30 - 52 watt	2,600



**focus on energy**  
The power is within you.

## CHOOSING THE RIGHT BULB

	HARP SHADE	CLAMP SHADE	PENDANT FIXTURE	CEILING FIXTURE	CEILING FAN	WALL SCORGE	RECESSED CAN	TRACK LIGHTING	OUTDOOR COVERED	OUTDOOR EXPOSED
<b>FOR THIS FIXTURE</b>										
<b>CHOOSE THIS BULB</b>	  		   	   	   	 	  		  	

### WHAT SHAPE AND SIZE?

Different fixtures need different types of bulbs. Using the chart above, find your fixture and then see which bulbs will work best.

### SHOPPING TIPS

When shopping for a CFL, keep the following guidelines in mind:

- Look for the ENERGY STAR label for products that meet or exceed government energy efficiency standards.
- Check the size of your light fixture so you buy the correct bulb size. CFLs come in a range of shapes, sizes and wattages.
- Select dimmable bulbs for use with dimmer switches. Not all CFLs are suitable for use with dimmer switches.
- Choose a CFL that uses one-third the wattage of the incandescent bulb you're replacing. For example, replace a 75-watt incandescent with a 18 - 20-watt CFL. This will ensure adequate illumination.
- Protect CFLs installed in outdoor fixtures from moisture.

### COLOR TEMPERATURE

Different light bulbs emit different colors of light. Lighting color ranges from cool to warm tones, and is known as color temperature. The color temperature of a light source indicates the color of the light emitted measured in degrees Kelvin. ENERGY STAR qualified bulbs offer a range of color temperature choices.

**Warm:** (2700° to 3000° Kelvin) A warm color temperature is preferred by people who like the color of light from incandescent bulbs. Lighting with warm color temperatures creates a welcoming atmosphere in bedrooms, dining rooms and living rooms. Choose a bulb that states "warm white" or "soft white" on the package.

**Cool:** (4100° Kelvin and up) Cooler color temperatures are sometimes preferred for clean, clear light in kitchens and in bathrooms. Choose a bulb that states "cool white" or "daylight" on the package.

## SOME DEFINITIONS

**CFLs.** Compact fluorescent light bulbs—low wattage, high lumen output lamp commonly replacing incandescent light bulbs today.

**Fluorescent lighting.** Method of producing light by sending electrical current through a tube of ionized gas.

**Incandescent lighting.** Method of producing light by heating a tungsten or halogen element.

**Lumens.** A measure of brightness of a light source. A 18W CFL and a 75W incandescent both provide about 1,100 lumens of brightness.

**Watts.** A measure of electrical power.

**kWh.** A kilowatt hour is a measure of electricity used over time. For example, ten 100-watt light bulbs, left on for one hour, would use one kWh (or 1,000 watt hours) of electricity.

fluorescent torchiere can save you up to \$180 in energy costs over its lifetime.

In comparison, halogen torchiere floor lamps' low purchase price masquerade as a good deal, when in reality they are expensive to operate and dangerous to use. Most of these torchieres use 300-watt quartz halogen bulbs, deliver as few as 15 lumens per watt and operate at temperatures in excess of 900° F. These lamps have caused fires when flammable materials such as curtains or drapes have come in contact with the bulb. They can pose a hazard for children or pets.

## MORE INFORMATION

[focusonenergy.com](http://focusonenergy.com)

Contact Focus to learn more about smart energy choices.

[energystar.gov](http://energystar.gov)

The ENERGY STAR site provides information on energy efficient products that meet ENERGY STAR standards. The lighting product information pages cover CFLs, fixtures and ceiling fans.

## COMPACT FLUORESCENT FIXTURES

When purchasing new lighting fixtures, (floor or table lamps, wall, ceiling-mounted or outdoor fixtures) look for ENERGY STAR qualified models. These fixtures are available in many styles and sizes and use energy efficient fluorescent bulbs (CFLs or tubes). Because they use CFLs, these fixtures operate at cooler temperatures for safer use and use at least 2/3 less energy than standard fixtures. Indoor fixtures that come with a CFL bulb last at least 10,000 hours.

## TORCHIERES

Compact fluorescent torchiere floor lamps have been available since 1997. They use a CFL that delivers more lumens per watt than their halogen counterparts and burn an average of 750°F cooler. Their higher purchase price is quickly offset by lower operating costs. A compact

## Lighting: Exit Signs

Looking for a quick way to reduce energy and maintenance bills? Exit signs that must be lit 24 hours a day, 7 days a week can take a bite out of commercial and industrial budgets, but today's more efficient exit signs can offer lifetime savings of up to \$300 per sign in reduced energy, materials, and labor costs as compared with standard incandescent models.

### What Are the Options?

**Incandescent lamps.** In traditional exit signs, two incandescent lamps typically light the sign. They draw 24 to 40 watts of power (**Table 1**), so depending on local prices, a single exit sign can run up electricity bills of more than \$30 per year. More importantly, exit signs are required to be on all the time and therefore the lamps burn out in a matter of months. The cost of replacement lamps and the labor to install them can add up to \$24 per year per sign, not to mention increasing the risk of having a sign out of order at the wrong time.

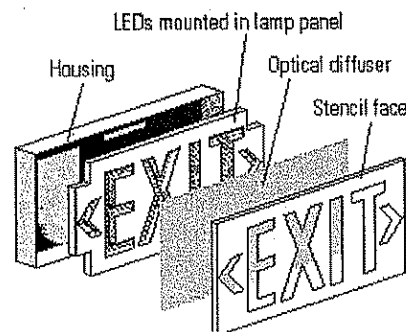
**Table 1: Comparison of exit sign alternatives**

Light source	Wattage	Life
Incandescent lamp	24 to 40	2 to 8 months
LEDs	<1 to 5	10+ years
CFLs	10 to 24	1 to 2 years
Electroluminescent panels	<1	10+ years
Photoluminescent materials	0	10+ years
Cold cathode	5	10 years

Source: E SOURCE

Today, the most cost-effective alternatives are the newest **light-emitting diode (LED)** exit signs (**Figure 1**). They use only 1 to 5 watts of power per surface and cost less than \$5 per year to operate, depending on the model and local utility costs. Because LEDs also last considerably longer than incandescent lamps, lifecycle savings are dramatic. Over a 10-year period, first costs, energy expenditures, and maintenance requirements for an incandescent sign could run about \$570, depending on local conditions, whereas a comparable LED unit with a 10-year life would incur overall costs of about \$125.

**Figure 1: Stencil-faced exit sign with diffuser**

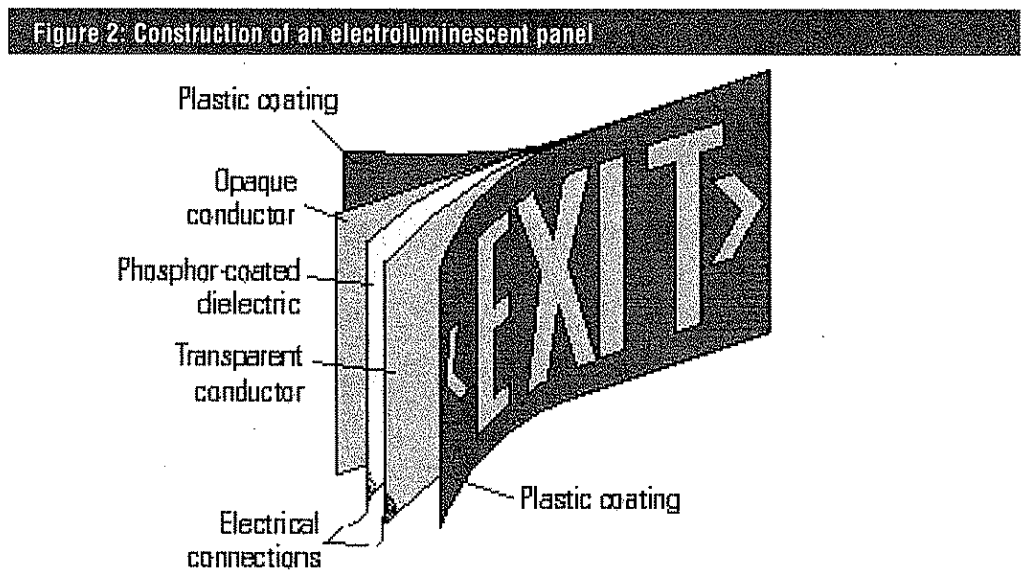


Source: E SOURCE

When LED signs were introduced, high first costs limited them to a few niche applications. In 1994, an LED unit cost roughly five times as much as an incandescent model, but that gap has narrowed—and in some cases vanished altogether. For example, there is no longer a price difference for commodity-grade signs with battery backup.

**Compact fluorescent lamps (CFLs).** Just a few years ago, CFL exit signs were the leading alternative to standard incandescent models, but they have all but disappeared from the market. The CFLs simply could not compete with LEDs in performance and lifecycle costs.

**Electroluminescent panels.** These panels (**Figure 2**) feature phosphors that light up when voltage is applied. Although the panels produce a uniform light and consume very little power, some products are costly and suffer high rates of lumen depreciation.



Source: Lithonia Lighting

**Cold cathode fluorescents.** Cold cathode lamps are a relative newcomer to the exit-sign scene, but this type of light source has been used for years in laptop computers. The tubes are thin (T1 lamps, or 1/8 inch in diameter) and they last a long time because they have no filaments. New shock-absorbing techniques have made the fragile lamps suitable for a larger range of applications, and their small size and uniform light output make them a good choice for exit signs. However, the technology offers a lower efficacy than conventional fluorescent lamps and is therefore not used for general lighting applications at present.

**Photoluminescent materials.** Some exit-sign manufacturers use photoluminescent materials that absorb and reradiate light. These signs do not require electrical power, but they need to be charged by light sources in their surrounding area. Improvements in the technology have led to recent acceptance by the National Fire Protection Code and recent UL approvals for some photoluminescent products. These products must maintain particular levels of visibility for at least 90 minutes after other sources of light have been extinguished.



## How to Make the Best Choice

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**Select an Energy Star-certified product.** Through the Energy Star program, the U.S. government has developed specifications for cost-effective, energy-efficient exit signs. A sign may carry the Energy Star label if it:

- consumes less than 5 watts of power per face,
- exceeds the National Fire Protection Association Safety Code 101 guidelines, and
- carries at least a five-year manufacturer warranty for defective parts.

Manufacturers test their products against these guidelines, and the Energy Star Web site lists all qualifying products. You'll find that most of the qualifying signs are made with LEDs. New Energy Star specifications—version 3.0—are in the works as of late 2003 and are planned for implementation starting August 1, 2004. The new specs, if adopted as they now stand, would allow self-illuminating signs such as those that use photoluminescent materials.

If you just pick something off the Energy Star list, you'll be making a good choice. To hone in on the most cost-effective option for your application, you can make use of the spreadsheet that's also available at the Energy Star Web site. First, select the products that meet your non-energy-related requirements, such as number of faces, battery backup, and so on. Next, contact the manufacturers to get the latest prices. Enter that price information in the spreadsheet to learn which product will deliver the best overall savings at the lowest cost.

**Pick products that use the newest LED technology.** Not all LED products offer equal performance. Exit signs using the newest LED technology start out brighter and maintain their brightness longer than those using older technologies. For red exit signs, look for products that use aluminum, indium, gallium, and phosphorus LEDs, referred to in the trade as AlInGaP.

**Don't be fooled by long warranties.** LEDs rarely burn out, but their brightness does fade over time, depending on the materials they are made of and the temperatures and humidity they are subjected to. In some applications, the brightness of a sign may diminish in just a few years to the point that it no longer meets code. Even so, in the past, many manufacturers offered long warranties on their products—in some cases for 25 years or more. Buyers often purchased the products with the expectation that they would last for the life of the building without any maintenance.

Although the newest LED products are expected to last longer than earlier signs, reputable manufacturers are now offering shorter warranties. Lithonia, for example, which uses the longest-lived LEDs available, backs up many of its products with a 5-year warranty. Lithonia believes the LEDs will last longer than that, but given that no 25-year tests have been conducted, the company did not want to mislead buyers.

**Are green LED signs a viable choice?** Green signs are preferred (or required) in some areas, but they are not permitted in Canada. (In Canada, standard CSA 860 covers the size, shape, and intensity of exit signs.) Early green LED products provided lower light



output than red LED signs, but new technology has created a green LED that is both bright and efficient. This technology is now available in products made by such companies as Gilbert Industries and Lithonia.

### **What's on the Horizon?**

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LED exit signs will likely continue to be the most cost-effective, energy-efficient option so long as prices keep falling and performance is improved. LEDs with efficacies greater than those of CFLs have already been tested in the laboratory. The growing use of LED technology in other applications (such as traffic lights and outdoor signage) should accelerate the introduction of new products in the exit sign arena as well. Research continues to produce improvements in photoluminescent and electroluminescent technologies as well.



## Shedding Light on Global Warming

Recent studies have certainly shed clear light on the question of global warming, its causes and probable consequences. Our planet is demonstrating dramatic climate changes and we're the culprit – our escalating use of fossil fuel energy for powering our cars, homes, buildings, and industry. It might be the most complex challenge our human race has ever faced and it certainly demands the highest level of national and international creativity, cooperation and commitment to resolve.

While technical and political solutions inch forward, we should all recognize that there are affordable, achievable action steps that we can each take right now to mitigate the problem. We can decide to construct high-performance energy efficient buildings and homes, we can drive the demand for fuel-efficient cars and alternative public transportation, and we can choose to purchase efficient equipment, appliances and lighting – such as compact fluorescent bulbs (the bulbs with a “twist.”) If each of us changed out just 5 of our regular light bulbs for 5 compact fluorescents, our country could reduce the carbon emissions that cause global warming by more than 34 million tons every year!

Wisconsin has stepped up to the plate by offering a wide range of information and incentive programs to encourage consumers and businesses to make energy efficient and renewable energy choices (see [www.FocusonEnergy.com](http://www.FocusonEnergy.com)). However, in some cases, it might be cheaper to specify additional energy saving technologies in our codes and standards. That is why we applaud and support the recent introduction of a Madison city ordinance that would require high efficiency lighting in the hallways and common areas of our rental properties. It's a win-win-win solution. Owners will see a decrease on their energy bills, tenants will recognize increased safety and better lighting quality, and we'll all benefit from one more positive action to address global warming.

Janet Brandt  
Executive Director



SIERRA  
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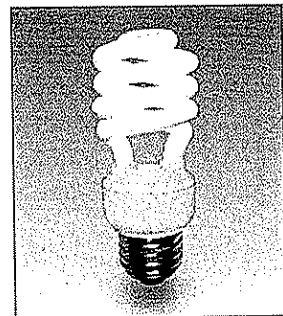
Explore, enjoy, and protect the planet

## Madison's Energy Efficiency and Safety Ordinance

### Efficient Lighting Makes Rentals Safer While Saving Energy and Money

Electricity production is the largest source of global warming pollution in the U.S. Lighting accounts for 25 percent of American electricity consumption. Across the nation and around the world, people are making the switch to efficient lighting, getting more light for less energy. As homeowners make the switch, some renters are left in the dark, relying on old-fashioned, inefficient lighting for their common areas, built-in fixtures, and exit signs. While many landlords have provided longer-lasting efficient lighting in their rental units, many have not. More than half of all Madisonians are renters, making Madison the perfect place to showcase the benefits of improving lighting efficiency in our rental properties. Madison's proposed Energy Efficiency and Safety Ordinance would set a lighting efficiency standard for rental units, ensuring that tenants have long-lasting, safer, and more efficient lighting – all while cutting global warming pollution and saving millions of dollars. The ordinance will:

- **Reduce Greenhouse Gas Emissions:** If all of the remaining old-fashioned light bulbs in Madison rental units were replaced with efficient light bulbs, Madison's global warming pollution would be cut by 35,000 tons – the equivalent of taking 6,000 cars off the road.
- **Save electricity:** Replacing remaining inefficient bulbs in rental properties would save 36,000,000 kilowatt-hours of electricity a year – enough to power more than 4,100 homes.
- **Save money for landlords:** Changing common area light bulbs, often on for 24 hours a day, can save up to \$40 *per bulb* on annual electricity bills – totaling over \$1 million for Madison rental properties. CFLs also reduce maintenance costs; they only need to be replaced once every 6 to 10 years, rather than the 2 or 3 times each year that old-fashioned incandescent light bulbs need to be replaced.
- **Save money for tenants:** Many Madison renters pay their own electricity bill. If landlords install only incandescents, tenants are forced to pay the higher electricity costs. Replacing remaining old-fashioned light bulbs in built-in fixtures in rental units would save over \$1 million each year in energy costs.
- **Overall, the Energy Efficiency and Safety Ordinance can save landlords and tenants over \$2 million per year.**
- **Enhance tenant safety:** Low maintenance, long-lasting CFLs last 20-30 times longer between changes as compared to incandescents, so tenants are less likely to be left in the dark due to burnt-out bulbs in stairways and common areas.
- **Improve efficiency and safety of exit signs:** The ordinance requires installation of LED exit signs, which consume 95% less energy than comparable incandescent-lit signs. Energy savings per LED exit sign can exceed \$40/year. LED exit signs are lower maintenance and safer; they can operate for 25 years or more, significantly decreasing the risk of a burnt out sign during a fire, and making rental properties safer to live in.



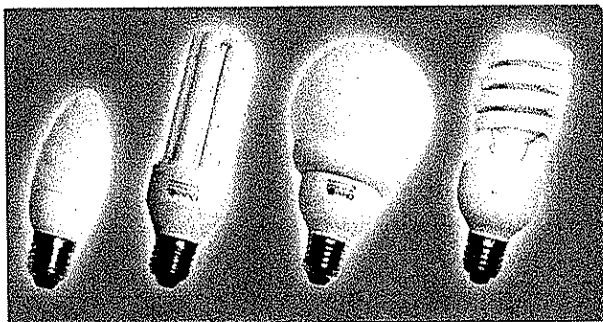
## What YOU can do to show your support:

- **Contact your alder:** Urge them to vote in favor of the ordinance. You can find your alder person at <http://www.ci.madison.wi.us/Council/findAddress.cfm>.
- **Write a letter to the editor:** Share your approval for energy-efficient, money-saving solutions.
- **Tell a friend:** Spread the word about the benefits of the Energy Efficiency and Safety Ordinance.

## Recycle your compact fluorescent bulbs

It's easy to do – just take the old bulb with you when you go to buy a new one. Madison requires stores that sell CFLs to take them back for recycling. While you won't need to replace CFLs very often – *they can last more than 10 years* – when you do, used bulbs need to be recycled so that small amounts of mercury in the bulbs end up in new bulbs rather than in the landfill.

Find a location near you at: [http://www.countyofdane.com/pwht/recycle/lamps\\_bulbs.aspx](http://www.countyofdane.com/pwht/recycle/lamps_bulbs.aspx)



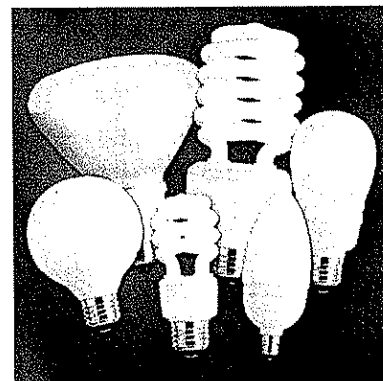
## What to do if a CFL breaks:<sup>1</sup>

Research indicates that there is no immediate health risk to you or your family if a broken bulb is cleaned up properly. Because there is such a small amount of mercury in CFLs, your greatest risk if a bulb breaks is getting cut from glass shards. You can minimize any risks by following these proper clean-up and disposal guidelines:

- Sweep up—don't vacuum—all of the glass fragments and fine particles.
- Place broken pieces in a plastic bag, wipe the area with a damp paper towel to pick up any stray shards of glass or fine particles, add the paper towel to the plastic bag, and seal well.
- Open windows to allow the room to ventilate.

## Did you know...

- **CFLs REDUCE OVERALL MERCURY EMISSIONS!** Wisconsin generates more than 75% of its electricity with coal. Coal is the biggest source of mercury to our environment. The electricity to power an old-fashioned, 60 watt incandescent bulb produces 12 milligrams (mg) of mercury pollution, while the electricity to power an equivalent 15 watt CFL for 10,000 hours (the average life of a CFL) only produces 3 milligrams of mercury. Even when one considers the 4 mg of recyclable mercury contained in the CFL, the efficient bulbs can cut mercury pollution over 40%!<sup>2</sup>
- **It would take over one hundred CFLs to equal the amount of mercury in a mercury thermometer.** CFLs contain about 4mg of mercury. This is a very small amount compared to the 500 mg in a mercury thermometer.
- **CFLs account for only 0.5% of household mercury!** CFLs make up a very small amount of the mercury in an average home: 46.7% of household mercury is found in thermostats, 21% in dental amalgams, 14.4% in light switches, and 4.7% in thermometers.<sup>3</sup>



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122 W. Washington Ave., Suite 830  
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(608) 257-4994  
[www.sierraclub.org](http://www.sierraclub.org)

<sup>1</sup> General Electric CFL frequently Asked Questions: [http://www.gelighting.com/na/home\\_lighting/ask\\_us/faq\\_compact.htm#mercury](http://www.gelighting.com/na/home_lighting/ask_us/faq_compact.htm#mercury)

<sup>2</sup> US EPA Fact Sheet, <http://www.nema.org/lamprecycle/epafactsheet-cfl.pdf>

<sup>3</sup> North Carolina Department of Environment and Natural Resources

Potential Energy Savings in Rental Units Lighting

Common Area Lighting

Units/bldg	# Buildings	# w/ common area	Common area fixtures/bldg	# bulbs to replace	Watts saved/bulb	kwh saved/bulb/year	total kwh saved/year	\$saved/ bulb/year	total money saved/year	lbs CO2 saved per bulb/year	tons CO2 saved/year	net payback @ \$1/bulb	net payback @ \$2/bulb
2 to 4	5,256	2,628	7	18,396	53	460	8,462,160	46	846,216	1,011	9,308	827,820	809,424
5 to 19	851	851	19	8,085	44	381	3,072,110	38	307,211	839	3,379	299,127	291,042
Totals	6,107	3,479		26,481			11,534,270		1,153,427		12,688	1,126,947	1,100,466

# buildings from Dane County tax data, 1997.

# w/common area, fixtures/bldg, # bulbs to replace taken from proportions found for all W1 rental housing in ECW Rental Characterization report and applied to the # of bldg:

Note: the ECW study says that buildings w/ more than 19 units have pretty much all switched over to save themselves money, so I left those out of the calculations.

Watts saved/bulb from ECW report: average incandescent wattage found in rentals of that size less average CFL wattage found in same.

kwh saved/bulb/year assumes the bulbs are on 24 hours/day, 7 days/week, 365 days/year because bulbs are in common areas

total kwh saved/year is # bulbs to replace multiplied by kwh saved/bulb/year

\$ saved/bulb/year assumes \$.10/kwh - average from my MG&E bill

total \$ saved/year is \$saved/bulb times # bulbs to replace, not including cost of bulbs

lbs co2 saved/bulb/year assumes 2.2 lbs co2/kwh as per #'s from MG&E

tons co2 saved/year is lbs CO2 saved per bulb/year times #bulbs to replace/2000

In-Unit Lighting

Units/bldg	# Units	Fixtures/unit	% to be replaced	# bulbs to replace	total watts saved, all bulbs	kwh saved/year	\$ saved/year	tons CO2 saved/year	net payback @ \$1/bulb	net payback @ \$2/bulb
One	3,485	15	81	42,343	1,905,424	2,781,919	278,192	3,060	235,849	193,506
2 to 4	13,126	11	88	127,060	5,717,686	8,347,821	834,782	9,183	707,722	580,663
5 to 19	7,217	12	95	82,274	3,702,321	5,405,389	540,539	5,946	458,265	375,991
20 +	14,923	9	89	119,533	5,378,995	7,853,333	785,333	8,639	665,800	546,267
Totals	38,751			371,209	16,704,426	24,388,462	2,438,846	26,827	2,067,637	1,696,427

\*assume 60 watt incandescent replaced with 15 watt CFL, assume 4 hours use/day

#units taken from Dane County tax data, 1997

Fixtures/unit, %to be replaced from ECW rental characterization report, using state-wide generalizations

# bulbs to replace calculated by using ECW report proportions times fixtures/unit times #Units

total watts saved all bulbs calculated as 45 watt savings times # bulbs to replace

kwh saved/year assumes 4hours bulb operation/day, 365 days/year

\$ saved/year assumes \$.10/kwh

tons co2 saved/year assumes 2.2 lbs CO2/kwh

**Exit Lighting**

	#	Total #	Incandescent				Fluorescent				Total		
			Buildings	exit signs	incandescent	fluorescent	total kwh saved/year	total \$ saved/year	tons CO2 saved/year	total kwh saved/year	total \$ saved/year	tons CO2 saved/year	
2 to 4	5,256	420	223	84	52,000 to 95,000	\$5,200 to 9,500	57 to 105	5,000 to 10,000	\$500 to 1,000	5 to 12	57,000 to 105,000	\$5,700 to 10,500	62 to 117
5 to 19	851	1,132	377	377	88,000 to 160,000	\$8,800 to 16,000	97 to 176	22,000 to 49,000	\$2,200 to 4,900	25 to 53	110,000 to 209,000	\$11,000 to 20,900	122 to 229
20 +	284	3,948	1,579	395	370,000 to 671,000	\$37,000 to 67,100	407 to 738	23,000 to 51,000	\$2,300 to 5,100	26 to 56	393,000 to 732,000	\$39,300 to 73,200	433 to 794
<b>Totals</b>	<b>6,391</b>	<b>5,500</b>	<b>2,179</b>	<b>856</b>	<b>510,000 to 926,000</b>	<b>\$51,000 to 92,600</b>	<b>561 to 1,019</b>	<b>51,000 to 111,000</b>	<b>\$5,100 to 11,100</b>	<b>57 to 122</b>	<b>561,000 to 1,037,000</b>	<b>\$56,100 to 103,700</b>	<b>618 to 1141</b>

# Buildings from 1997 Dane County tax data

Total # exit signs from e-mail from ECW staff Scott Pigg - new calculations from ECW rental characterization report. He noted that these are very rough estimates

Units avg # signs/bldg

2-4 unit bld 0.08

5-19 unit bl 1.33

20+ unit bl 13.9

# Incandescent and # fluorescent from proportions given in ECW rental characterization study, state-wide averages times total # exit signs

Ranges of kwh saved/year for incandescent and fluorescent taken from literature survey

total \$ saved/year assumes \$.10/kwh, does not include cost of signs

tons CO2 saved/year assumes 2.2lbs CO2/kwh, from MG&E

\$50/sign, total incandescent replacements = 108,959

total for fluorescent replacements = 42,807



## Ominous Arctic Melt Worries Experts

**'Arctic Is Screaming,' Say Scientists Seeing New Data; Worry Over 'Tipping Point'**

By **SETH BORENSTEIN**

*The Associated Press*

**WASHINGTON**

An already relentless melting of the Arctic greatly accelerated this summer, a warning sign that some scientists worry could mean global warming has passed an ominous tipping point. One even speculated that summer sea ice would be gone in five years.

Greenland's ice sheet melted nearly 19 billion tons more than the previous high mark, and the volume of Arctic sea ice at summer's end was half what it was just four years earlier, according to new NASA satellite data obtained by The Associated Press.

"The Arctic is screaming," said Mark Serreze, senior scientist at the government's snow and ice data center in Boulder, Colo.

Just last year, two top scientists surprised their colleagues by projecting that the Arctic sea ice was melting so rapidly that it could disappear entirely by the summer of 2040.

This week, after reviewing his own new data, NASA climate scientist Jay Zwally said: "At this rate, the Arctic Ocean could be nearly ice-free at the end of summer by 2012, much faster than previous predictions."

So scientists in recent days have been asking themselves these questions: Was the record melt seen all over the Arctic in 2007 a blip amid relentless and steady warming? Or has everything sped up to a new climate cycle that goes beyond the worst case scenarios presented by computer models?

"The Arctic is often cited as the canary in the coal mine for climate warming," said Zwally, who as a teenager hauled coal. "Now as a sign of climate warming, the canary has died. It is time to start getting out of the coal mines."

It is the burning of coal, oil and other fossil fuels that produces carbon dioxide and other greenhouse gases, responsible for man-made global warming. For the past several days, government diplomats have been debating in Bali, Indonesia, the outlines of a new climate treaty calling for tougher limits on these gases.

What happens in the Arctic has implications for the rest of the world. Faster melting there means eventual sea level rise and more immediate changes in winter weather because of less sea ice.



In the United States, a weakened Arctic blast moving south to collide with moist air from the Gulf of Mexico can mean less rain and snow in some areas, including the drought-stricken Southeast, said Michael MacCracken, a former federal climate scientist who now heads the nonprofit Climate Institute. Some regions, like Colorado, would likely get extra rain or snow.

More than 18 scientists told the AP that they were surprised by the level of ice melt this year.

"I don't pay much attention to one year ... but this year the change is so big, particularly in the Arctic sea ice, that you've got to stop and say, 'What is going on here?' You can't look away from what's happening here," said Waleed Abdalati, NASA's chief of cyrospheric sciences. "This is going to be a watershed year."

2007 shattered records for Arctic melt in the following ways:

552 billion tons of ice melted this summer from the Greenland ice sheet, according to preliminary satellite data to be released by NASA Wednesday. That's 15 percent more than the annual average summer melt, beating 2005's record.

A record amount of surface ice was lost over Greenland this year, 12 percent more than the previous worst year, 2005, according to data the University of Colorado released Monday. That's nearly quadruple the amount that melted just 15 years ago. It's an amount of water that could cover Washington, D.C., a half-mile deep, researchers calculated.

The surface area of summer sea ice floating in the Arctic Ocean this summer was nearly 23 percent below the previous record. The dwindling sea ice already has affected wildlife, with 6,000 walrus coming ashore in northwest Alaska in October for the first time in recorded history. Another first: the Northwest Passage was open to navigation.

Still to be released is NASA data showing the remaining Arctic sea ice to be unusually thin, another record. That makes it more likely to melt in future summers. Combining the shrinking area covered by sea ice with the new thinness of the remaining ice, scientists calculate that the overall volume of ice is half of 2004's total.

Alaska's frozen permafrost is warming, not quite thawing yet. But temperature measurements 66 feet deep in the frozen soil rose nearly four-tenths of a degree from 2006 to 2007, according to measurements from the University of Alaska. While that may not sound like much, "it's very significant," said University of Alaska professor Vladimir Romanovsky.

- Surface temperatures in the Arctic Ocean this summer were the highest in 77 years of record-keeping, with some places 8 degrees Fahrenheit above normal, according to research to be released Wednesday by University of Washington's Michael Steele.

Greenland, in particular, is a significant bellwether. Most of its surface is covered by ice. If it completely melted something key scientists think would likely take centuries, not decades it could add more than 22 feet to the world's sea level.

However, for nearly the past 30 years, the data pattern of its ice sheet melt has zigzagged. A bad year, like 2005, would be followed by a couple of lesser years.

According to that pattern, 2007 shouldn't have been a major melt year, but it was, said Konrad Steffen, of

the University of Colorado, which gathered the latest data.

"I'm quite concerned," he said. "Now I look at 2008. Will it be even warmer than the past year?"

Other new data, from a NASA satellite, measures ice volume. NASA geophysicist Scott Luthcke, reviewing it and other Greenland numbers, concluded: "We are quite likely entering a new regime."

Melting of sea ice and Greenland's ice sheets also alarms scientists because they become part of a troubling spiral.

White sea ice reflects about 80 percent of the sun's heat off Earth, NASA's Zwally said. When there is no sea ice, about 90 percent of the heat goes into the ocean which then warms everything else up. Warmer oceans then lead to more melting.

"That feedback is the key to why the models predict that the Arctic warming is going to be faster," Zwally said. "It's getting even worse than the models predicted."

NASA scientist James Hansen, the lone-wolf researcher often called the godfather of global warming, on Thursday was to tell scientists and others at the American Geophysical Union scientific in San Francisco that in some ways Earth has hit one of his so-called tipping points, based on Greenland melt data.

"We have passed that and some other tipping points in the way that I will define them," Hansen said in an e-mail. "We have not passed a point of no return. We can still roll things back in time but it is going to require a quick turn in direction."

Last year, Cecilia Bitz at the University of Washington and Marika Holland at the National Center for Atmospheric Research in Colorado startled their colleagues when they predicted an Arctic free of sea ice in just a few decades. Both say they are surprised by the dramatic melt of 2007.

Bitz, unlike others at NASA, believes that "next year we'll be back to normal, but we'll be seeing big anomalies again, occurring more frequently in the future." And that normal, she said, is still a "relentless decline" in ice.

On the Net:

National Snow and Ice Data Center on 2007 Arctic sea ice:

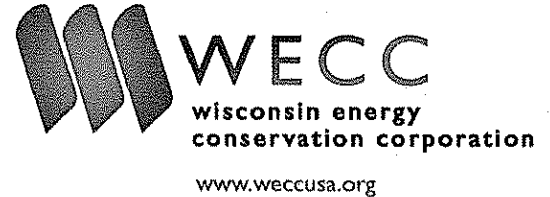
[http://nsidc.org/news/press/2007\\_seaiceminimum/20070810\\_index.html](http://nsidc.org/news/press/2007_seaiceminimum/20070810_index.html)

NASA's "Tipping Points" panel and slide show materials:

[http://www.nasa.gov/topics/earth/tipping\\_points.html](http://www.nasa.gov/topics/earth/tipping_points.html)

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## Shedding Light on Global Warming

Recent studies have certainly shed clear light on the question of global warming, its causes and probable consequences. Our planet is demonstrating dramatic climate changes and we're the culprit – our escalating use of fossil fuel energy for powering our cars, homes, buildings, and industry. It might be the most complex challenge our human race has ever faced and it certainly demands the highest level of national and international creativity, cooperation and commitment to resolve.

While technical and political solutions inch forward, we should all recognize that there are affordable, achievable action steps that we can each take right now to mitigate the problem. We can decide to construct high-performance energy efficient buildings and homes, we can drive the demand for fuel-efficient cars and alternative public transportation, and we can choose to purchase efficient equipment, appliances and lighting – such as compact fluorescent bulbs (the bulbs with a “twist.”) If each of us changed out just 5 of our regular light bulbs for 5 compact fluorescents, our country could reduce the carbon emissions that cause global warming by more than 34 million tons every year!

Wisconsin has stepped up to the plate by offering a wide range of information and incentive programs to encourage consumers and businesses to make energy efficient and renewable energy choices (see [www.Focus on Energy.com](http://www.Focus on Energy.com)). However, in some cases, it might be cheaper to specify additional energy saving technologies in our codes and standards. That is why we applaud and support the recent introduction of a Madison city ordinance that would require high efficiency lighting in the hallways and common areas of our rental properties. It's a win-win-win solution. Owners will see a decrease on their energy bills, tenants will recognize increased safety and better lighting quality, and we'll all benefit from one more positive action to address global warming.

Janet Brandt  
Executive Director



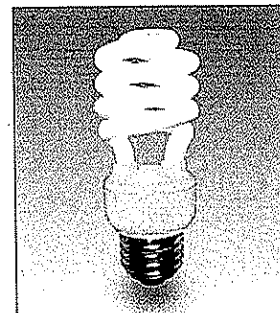
Explore, enjoy, and protect the planet

## Madison's Energy Efficiency and Safety Ordinance

### Efficient Lighting Makes Rentals Safer While Saving Energy and Money

Electricity production is the largest source of global warming pollution in the U.S. Lighting accounts for 25 percent of American electricity consumption. Across the nation and around the world, people are making the switch to efficient lighting, getting more light for less energy. As homeowners make the switch, some renters are left in the dark, relying on old-fashioned, inefficient lighting for their common areas, built-in fixtures, and exit signs. While many landlords have provided longer-lasting efficient lighting in their rental units, many have not. More than half of all Madisonians are renters, making Madison the perfect place to showcase the benefits of improving lighting efficiency in our rental properties. Madison's proposed Energy Efficiency and Safety Ordinance would set a lighting efficiency standard for rental units, ensuring that tenants have long-lasting, safer, and more efficient lighting – all while cutting global warming pollution and saving millions of dollars. The ordinance will:

- **Reduce Greenhouse Gas Emissions:** If all of the remaining old-fashioned light bulbs in Madison rental units were replaced with efficient light bulbs, Madison's global warming pollution would be cut by 35,000 tons – the equivalent of taking 6,000 cars off the road.
- **Save electricity:** Replacing remaining inefficient bulbs in rental properties would save 36,000,000 kilowatt-hours of electricity a year – enough to power more than 4,100 homes.
- **Save money for landlords:** Changing common area light bulbs, often on for 24 hours a day, can save up to \$40 *per bulb* on annual electricity bills – totaling over \$1 million for Madison rental properties. CFLs also reduce maintenance costs; they only need to be replaced once every 6 to 10 years, rather than the 2 or 3 times each year that old-fashioned incandescent light bulbs need to be replaced.
- **Save money for tenants:** Many Madison renters pay their own electricity bill. If landlords install only incandescents, tenants are forced to pay the higher electricity costs. Replacing remaining old-fashioned light bulbs in built-in fixtures in rental units would save over \$1 million each year in energy costs.
- **Overall, the Energy Efficiency and Safety Ordinance can save landlords and tenants over \$2 million per year.**
- **Enhance tenant safety:** Low maintenance, long-lasting CFLs last 20-30 times longer between changes as compared to incandescents, so tenants are less likely to be left in the dark due to burnt-out bulbs in stairways and common areas.
- **Improve efficiency and safety of exit signs:** The ordinance requires installation of LED exit signs, which consume 95% less energy than comparable incandescent-lit signs. Energy savings per LED exit sign can exceed \$40/year. LED exit signs are lower maintenance and safer; they can operate for 25 years or more, significantly decreasing the risk of a burnt out sign during a fire, and making rental properties safer to live in.



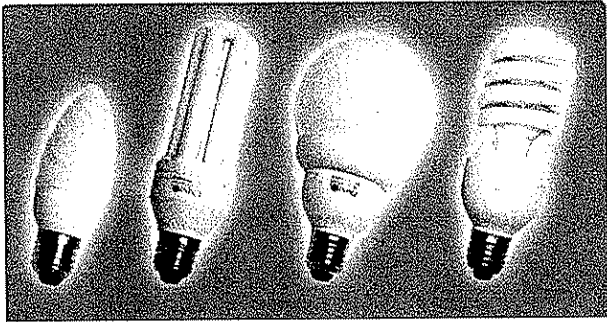
## What YOU can do to show your support:

- **Contact your alder:** Urge them to vote in favor of the ordinance. You can find your alder person at <http://www.ci.madison.wi.us/Council/findAddress.cfm>.
- **Write a letter to the editor:** Share your approval for energy-efficient, money-saving solutions.
- **Tell a friend:** Spread the word about the benefits of the Energy Efficiency and Safety Ordinance.

## Recycle your compact fluorescent bulbs

It's easy to do – just take the old bulb with you when you go to buy a new one. Madison requires stores that sell CFLs to take them back for recycling. While you won't need to replace CFLs very often – *they can last more than 10 years* – when you do, used bulbs need to be recycled so that small amounts of mercury in the bulbs end up in new bulbs rather than in the landfill.

Find a location near you at: [http://www.countyofdane.com/pwht/recycle/lamps\\_bulbs.aspx](http://www.countyofdane.com/pwht/recycle/lamps_bulbs.aspx)



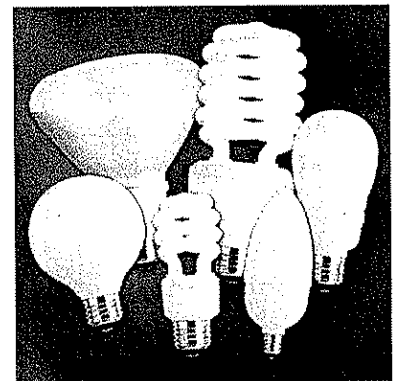
## What to do if a CFL breaks:<sup>1</sup>

Research indicates that there is no immediate health risk to you or your family if a broken bulb is cleaned up properly. Because there is such a small amount of mercury in CFLs, your greatest risk if a bulb breaks is getting cut from glass shards. You can minimize any risks by following these proper clean-up and disposal guidelines:

- Sweep up—don't vacuum—all of the glass fragments and fine particles.
- Place broken pieces in a plastic bag, wipe the area with a damp paper towel to pick up any stray shards of glass or fine particles, add the paper towel to the plastic bag, and seal well.
- Open windows to allow the room to ventilate.

## Did you know...

- **CFLs REDUCE OVERALL MERCURY EMISSIONS!** Wisconsin generates more than 75% of its electricity with coal. Coal is the biggest source of mercury to our environment. The electricity to power an old-fashioned, 60 watt incandescent bulb produces 12 milligrams (mg) of mercury pollution, while the electricity to power an equivalent 15 watt CFL for 10,000 hours (the average life of a CFL) only produces 3 milligrams of mercury. Even when one considers the 4 mg of recyclable mercury contained in the CFL, the efficient bulbs can cut mercury pollution over 40%!<sup>2</sup>
- **It would take over one hundred CFLs to equal the amount of mercury in a mercury thermometer.** CFLs contain about 4mg of mercury. This is a very small amount compared to the 500 mg in a mercury thermometer.
- **CFLs account for only 0.5% of household mercury!** CFLs make up a very small amount of the mercury in an average home: 46.7% of household mercury is found in thermostats, 21% in dental amalgams, 14.4% in light switches, and 4.7% in thermometers.<sup>3</sup>



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<sup>1</sup> General Electric CFL frequently Asked Questions: [http://www.gelighting.com/na/home\\_lighting/ask\\_us/faq\\_compact.htm#mercury](http://www.gelighting.com/na/home_lighting/ask_us/faq_compact.htm#mercury)

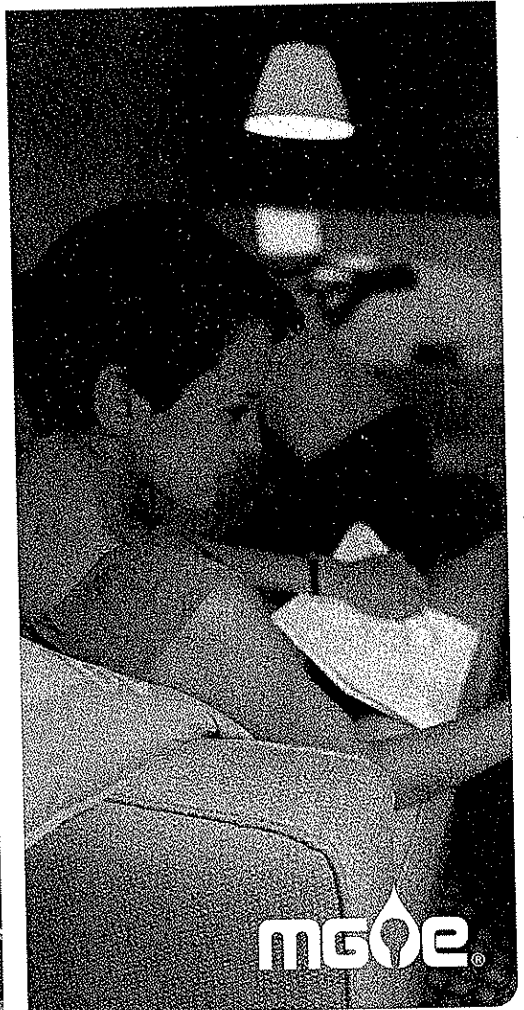
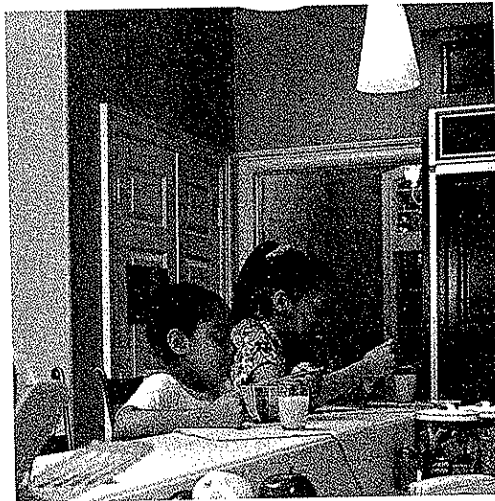
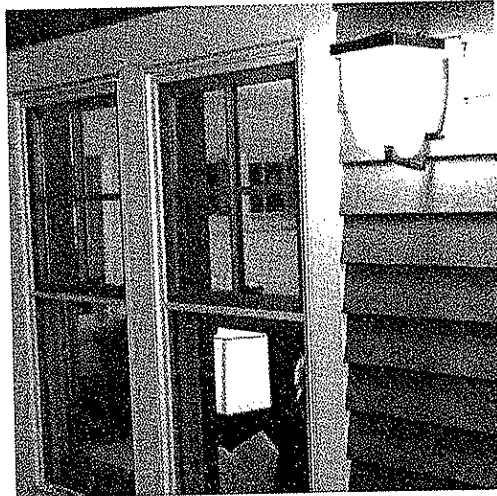
<sup>2</sup> US EPA Fact Sheet, <http://www.nema.org/lamprecycle/epafactsheet-cfl.pdf>

<sup>3</sup> North Carolina Department of Environment and Natural Resources

responsiblenergy

# lighting

bright new ideas



mgoe



## taking responsibility

As an individual, your efficient use of energy brings benefits such as lower bills, improved comfort levels in your home and a reduced personal impact on the environment.

Acting together, our individual choices add up—for the benefit of our community, our environment and our energy future. That's the power of working together.

As your community energy company, we are committed to sharing our experience and energy expertise. You can always contact us for:

- Answers to your energy questions.
- Energy efficiency information and advice.
- Help in evaluating energy-saving options.
- Assistance in finding energy-efficient products.

## Better ways to illuminate your world

This booklet offers a world of easy, innovative ways to save energy and money while lighting your home. Visit [mge.com](http://mge.com) or call us at 252-7117 for more information on these and other energy-saving ideas.

### Table of contents

Compact fluorescents vs. incandescent bulbs	2
CFLs	2
When buying CFLs	3
Myths and facts about CFLs	5
Where to buy energy-efficient lighting	6
Frequently asked questions about energy-efficient lighting	6
More ways to save on lighting	8
Daylighting	8
When in doubt, turn it out!	9
Bulb cost comparison	9
Other types of lighting	10
Torchieres	12
Controls for lighting	14
Recycling/disposal	14
Report streetlight problems	15
Glossary of terms	16
Resources and references	17



## Compact fluorescents vs. incandescent bulbs



Incandescent lightbulbs are inefficient, converting only about 10% of the electricity used into light. The other 90% is wasted as heat.

**Compact fluorescent** (CFL) bulbs are about four times as efficient as incandescent bulbs. MGE recommends using fluorescent bulbs to save money and prevent pollution.

### CFLs

- Last about 10 times longer than incandescents.
- Save about \$50 in electricity over the life of the bulb. The electricity saved avoids burning 400 pounds of coal at the power plant.

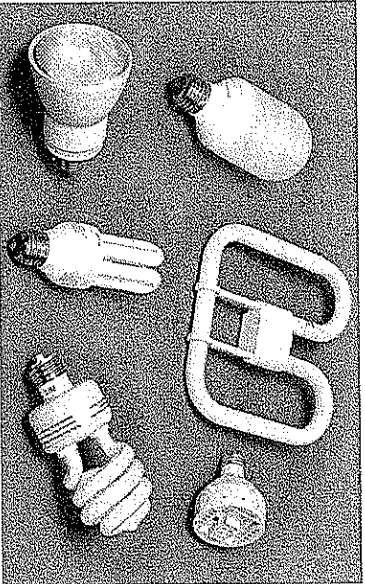


Figure 1: Compact fluorescent bulbs fit most sockets.

Look for the ENERGY STAR® label when buying lightbulbs, fixtures or lamps. Cash-Back Rewards for buying ENERGY STAR lighting are often available through the Focus on Energy program. Call MGE's Home Energy Line at (608) 252-7117 for details.



CHANGE FOR THE BETTER WITH ENERGY STAR

ENERGY STAR labeled products use less energy than other products. They reduce your energy costs and help to protect the

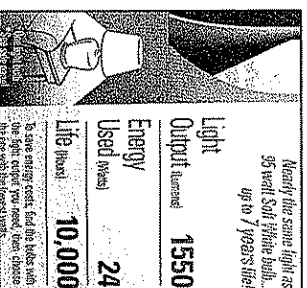
environment. MGE is an ENERGY STAR partner. Learn more about qualifying products at [www.energystar.gov](http://www.energystar.gov) or call MGE at (608) 252-7117.

### When buying CFLs

- Look for lumens. Light output is measured in lumens, while power used is measured in watts. Use the table below to match the lumen output of the CFL to the equivalent incandescent.

Incandescent Watts	CFL Watt Range	Approximate Lumens
60	13 to 18	890
75	18 to 22	1,210
100	23 to 28	1,750
150	30 to 38	2,780

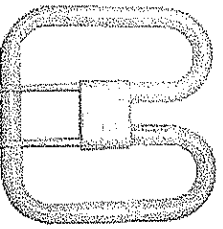
Or, check the lumen output label on an incandescent bulb that's the brightness you want, then look for a CFL with 20% more lumens. This ensures you'll get enough light from the CFL. Lumens per watt measures lighting efficiency much like miles per gallon measures automobile efficiency.



Lumen output label.

Efficacies of Today's Lighting Technologies	
Bulb Type	Efficacy (Lumens/Watt)
Incandescent	10 to 20
Halogen	20 to 35
Fluorescent	35 to 90
Mercury Vapor	40 to 60
Metal Halide	60 to 70
High-Pressure Sodium	50 to 70

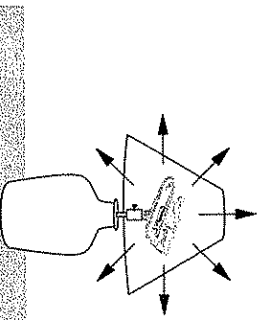
- Make sure the CFL will fit. CFLs are much smaller than they used to be, so they fit more lamps and fixtures than before. For most table lamps, circular or 2D-style CFLs are best.



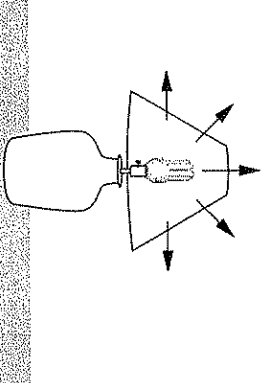
2-D



Circular (Circline)



2-D and circular styles direct light down for reading.



Other styles direct light sideways and up.

## Myths and facts about CFLs

### Myths

- They flicker, hum and blink on and off when they start.

### Facts

- Fluorescents with electronic ballasts don't flicker or hum, and they start instantly. Older-style fluorescents with magnetic ballasts were prone to these problems.

- They put out ugly bluish light.

- Fluorescents now emit a warm white light similar to incandescents, although cool white lights are available for people who prefer light closer to sunlight.

- They don't fit in my fixture.

- CFLs are now small enough for most applications.

- They cost too much to purchase.

- CFLs save enough electricity to pay for themselves two or three times over. The cost of lighting is mostly the electricity used, not the bulb cost.

- They are too dim.

- CFLs are available that produce more light than a 150-watt incandescent.

- They don't work with dimmers.

- Dimmable fluorescents are available, although they cost more than regular CFLs. Be sure the label says dimmable though! Otherwise, you could start a fire.

- They don't come in three-way styles.

- Three-way CFLs are available.

## Where to buy energy-efficient lightings

Hardware stores, home improvement stores and lighting stores sell energy-efficient lighting. CFLs are often carried by department stores and grocery stores that sell light bulbs. MGE encourages customers to buy from local retailers; however, the following online stores carry a wide variety of lights:

[www.efi.org](http://www.efi.org)

(800) 456-5983

[www.energyguide.com](http://www.energyguide.com)

[www.bulbs.com](http://www.bulbs.com)

(888) 445-2800

MGE's list of Madison-area retailers who carry energy-efficient lighting is on our Web site at [mge.com/home/appliances/lighting/wheretobuy.htm](http://mge.com/home/appliances/lighting/wheretobuy.htm). Or call the Home Energy Line at (608) 252-7117 to have a copy sent to you.

## Frequently asked questions about energy-efficient lighting

**Q: I have trouble fitting CFL bulbs into my light fixtures. Are there small CFLs on the market?**

**A:** The smallest CFL that will replace a 60-watt incandescent bulb is about 4.25 inches long (or the same length as an incandescent bulb) and will fit in porch lights, table lamps and other small light fixtures. Even smaller CFLs are on the way.

**Q: Can I put CFL bulbs inside an enclosed fixture?**

**A:** Yes. An increasing number of CFLs can now fit in enclosed fixtures. Look at the product packaging to be sure the bulb is appropriate for enclosed fixtures.

**Q: When shopping for CFLs, do I compare watts or lumens?**

**A:** The amount of light a lamp produces is measured in lumens; watt is a measure of power consumption, not light output. Energy consumption and light output are both printed on lamp packaging so consumers can choose the highest amount of light for the least amount of energy.

**Q: Can I use CFLs in recessed can lights?**

**A:** Reflector CFLs are manufactured specifically for use in down lights or "cans." They can help consumers save up to 75% in energy costs when used for general illumination (kitchen and hallways, for example).

**Q: What is ENERGY STAR?**

**A:** ENERGY STAR is a voluntary partnership between the U.S. Department of Energy, the U.S. Environmental Protection Agency, product manufacturers, local utilities and retailers. Partners promote efficient products by using ENERGY STAR labels and educating consumers about the benefits of energy-efficient products.

**Q: Can I use CFLs outdoors?**

**A:** Yes, but place the CFL in a location where it is protected from rain and snow and the minimum temperature requirements (as printed on the package) are met.

**Q: Can I use a CFL on a photocell or electronic timer?**

A: Some photocells and electronic timers contain electronics that may be incompatible with those in a CFL resulting in a shorter lamp life.

**Q: Which fixtures should I convert to CFLs?**

A: Start with lights that are used the most, usually the kitchen, living room and entry lights.

**Q: Are CFLs better for the environment?**

A: Incandescent bulbs release more than twice as much mercury as fluorescent bulbs due to the greater amount of coal burned to power incandescents.

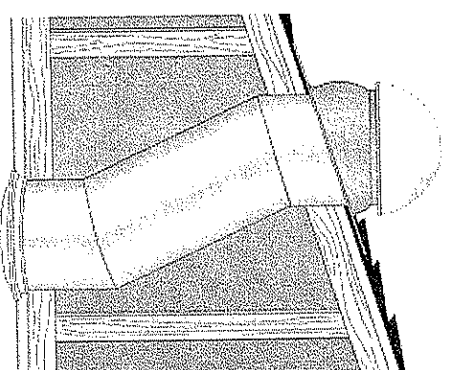
**Q: Why do some CFLs take a minute or two to reach full brightness?**

A: It's a trade-off that gives greater efficiency when the CFL is fully warmed up.

**More ways to save on lighting**

**Daylighting**

Sunlight is free! In addition to windows, skylights and roof windows, tubular skylights (light pipes) are available. Light pipes avoid the condensation problems of regular skylights. Many people prefer sunlight over artificial light.



Tubular skylight (light pipe)

**When in doubt, turn it out!**

The most efficient light is one that's off when it's not needed. The persistent myth that it is better to leave lights on than to turn them off is wrong, even for fluorescents. Lights don't consume a big gulp of energy when they're turned on, so if a light won't be needed for a few minutes, turn it off. The cost of lighting is mostly the electricity used, not the cost of the bulbs.

Bulb Cost Comparison						
	Life Span (Hours)	No. of Bulbs	Operating Cost	Purchase Price	Life-Cycle Cost	Net Savings
15-Watt Compact Fluorescent	10,000	1	\$20	\$6	\$26	\$59
60-Watt Incandescent	1,000	10	\$80	\$5	\$85	-

Use an ENERGY STAR CFL instead of a long-life incandescent bulb. Most long-life incandescents produce much less light per watt.

Choose new low-wattage night-lights. Some use only one-quarter watt compared to older seven-watt models.

**What's a kilowatt-hour?**  
Kilowatt-hours (kWh) are units of energy. Electric meters measure the kWh used by customers. For example, a 100-watt lightbulb burning for 10 hours would use one kWh. A kWh costs about 13 cents at 2006 rates.

## Other types of lighting

**High-intensity discharge (HID)** lights are good outside security lights. Many come with a dusk-to-dawn photocell. The bulb will not work in regular fixtures because it needs a ballast. HID bulbs may take several minutes to reach full brightness.

### Two common HID lights:



*Metal halide bulb*

- **Metal halide lamps** produce an excellent white color quality and a high lumens-per-watt (LPW) efficiency (see page 4). They are often used in gymnasiums, stores and other places where color rendition is important.

- **High-pressure sodium (HPS)** lamps are common in streetlights, and the 35- to 70-watt bulbs are excellent for residential outdoor security lights. HPS have a white-yellow glow with a high LPW efficiency (see page 4).

**Halogen incandescents** (see Figure 2) provide bright white light. Halogens are about 10% more efficient and last three to four times longer than standard incandescents. (Note: Don't use in wet locations.)

**Quartz halogen bulbs** (see Figure 2) produce a bright white light and intense heat. Lamps need a lens shield to protect the user from UV light and shattered glass in case the bulb overheats.

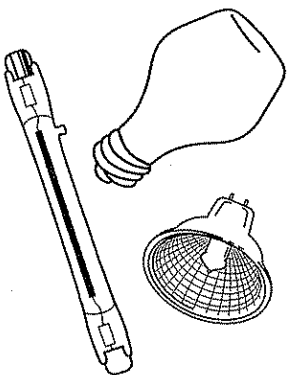


Figure 2: (clockwise from upper left) A-line, multifaceted reflector (MR) and quartz.

**Reflector bulbs** (Type R) work well for task or accent lighting. Reflectors come in spots which concentrate the light and floods which spread out the light. CFL reflector bulbs save money and last longer.

**ER lamps or elliptical reflectors** focus the light beam two inches ahead of the lamp. This reduces the amount of light trapped in the fixture. Replace a standard reflector lamp with an ER lamp, and cut the wattage by half.

**PAR lamps or parabolic-aluminized reflectors** have a durable glass lens that helps focus the light. Halogen PAR spots and floods produce light comparable to a standard reflector while using one-third less energy. Halogen PAR infrared (IR) bulbs save even more.

**Recessed lights** (can lights) may cause air-leakage problems, especially if they are in an insulated ceiling. Look for recessed lights that are airtight and rated for insulation contact (IC rated).

**Low-voltage task lighting** gives you more light in work areas. It uses halogen PAR or MR bulbs (see Figures 2 and 3).

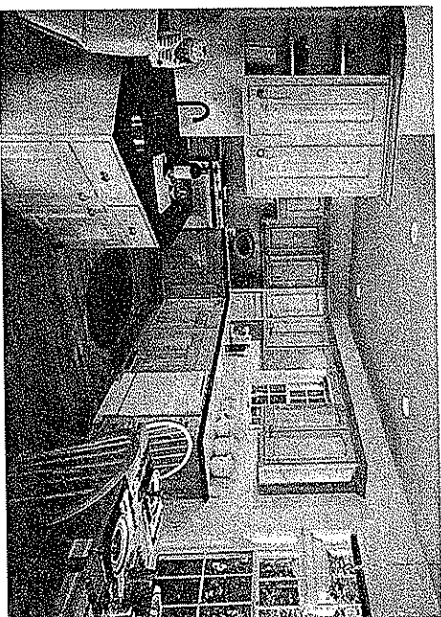


Figure 3: Use low-voltage halogens or T-5 fluorescents for under cabinet lighting.

**Low-voltage lights** (typically, landscape lights, track lights or task lights) are popular do-it-yourself projects. They can save energy compared to their line-voltage counterparts.

**Track lights** provide flexible positioning of lights and are available in both low-voltage and line-voltage (120-volt) versions.

**Photovoltaic lights** are powered by sunlight in combination with rechargeable batteries. Many are self-contained and can be staked into the ground to mark paths or highlight landscaping.

**Light-emitting diodes (LEDs)** are currently used in exit signs, traffic lights, photovoltaic lights, Christmas lights and camping lights. LEDs are very efficient and have an extremely long life. In the future, LEDs and other solid-state lighting technologies are expected to be used in a wide variety of lights.

## Torchieres

### Halogen torchieres are a safety hazard

Many apartment complexes and college dormitories have banned halogen torchiere lamps because of high energy consumption and fire potential. The bulb in a halogen torchiere can reach 700 to 1,000 degrees Fahrenheit.

According to the Consumer Products Safety Commission, in the United States alone, halogen torchieres have caused:

- 32 deaths.
- 114 injuries.
- 350 fires.
- Property damage from these fires exceeding \$2 million.



## Environmental impact

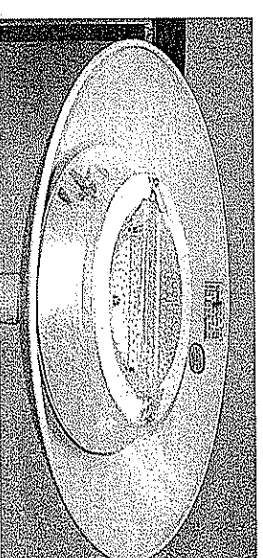
Electricity used by halogen torchieres causes about 12 million tons of carbon dioxide emission each year—as much as 22 billion miles of driving.

### A safe and energy-efficient alternative

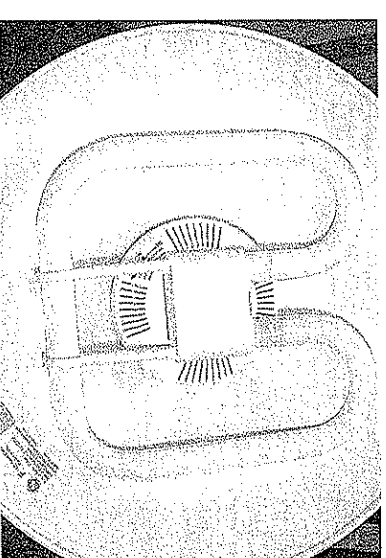
Compact fluorescent torchiere floor lamps:

- Produce natural-looking, high-quality light.
- Produce as much or more light than 300-watt halogen torchieres.
- Consume about one-sixth the electricity.

Look for compact fluorescent torchieres with the ENERGY STAR label for energy efficiency, safety and long life. They provide as much light as a 300-watt halogen torchiere but use only 50 to 80 watts. The low



*Halogen torchiere: Dangerous energy waster*



*Compact fluorescent torchiere: Safe energy saver*

operating temperature of fluorescent is much safer than halogen bulbs.

Special ballasts make these lamps two-way, three-way or dimmable.

Replace your halogen torchiere with an ENERGY STAR model and save more than \$200 in electric costs within seven years.

## Controls for lighting

**Motion sensors** are popular for outdoor fixtures but are not compatible with fluorescent or high-pressure sodium lights.

**Dusk-to-dawn photocells** are a good idea if you want to leave a light on all night. Make sure the photocell can be used with CFLs to avoid creating a fire hazard.

**Timers** turn indoor lights on and off. They do not save much energy, but they do avoid leaving lights on unnecessarily. If putting a CFL on a timer, only use a mechanical timer, not a digital one.

**Solid-state dimmer switches** save energy by limiting the amount delivered to the light. Note: Some new CFLs are dimmable.

**Occupancy sensors** turn lights on when a room becomes occupied and turn lights off after the room has emptied.

## Recycling/disposal

Mercury is a hazardous substance. When these bulbs end up in a landfill, the glass breaks and the mercury is released. You can avoid potential mercury pollution by recycling these bulbs.

The Dane County Landfill no longer accepts these bulbs. You can recycle them at several locations in Dane County for little or no charge for small quantities. The City of Madison requires stores that sell fluorescent bulbs to collect and recycle them.

For a list of bulb recycling locations in Dane County, see: [www.co.dane.wi.us/danedept/pubworks/recycle/lights.asp](http://www.co.dane.wi.us/danedept/pubworks/recycle/lights.asp)

## Report streetlight problems

As your community energy company, we help provide for the safety of our citizens and want to reduce unnecessary energy use.

Please help by reporting streetlights needing repair.\*

Out at night .....(608) 252-7111  
(select option 3)

On during the day .....(608) 252-7333

Cycling on and off (this means they  
are going to burn out soon) .....(608) 252-7333

Or, simply send an e-mail to [customerservices@mge.com](mailto:customerservices@mge.com) with the following information:

- Your name and daytime phone number
- Address/intersection of the affected street lamp
- Brief description of the problem

\*Note: Our service area covers most of the streetlights in Madison, Monona, Middleton, Fitchburg, Cross Plains, Maple Bluff and Shorewood Hills.



## Glossary of terms

**Ballast:** A device needed to operate fluorescent and HID lights. Electronic ballasts are better than old-style magnetic ballasts for most purposes.

**Bulb life:** Number of hours the average bulb will operate.

**Compact fluorescent lamps (CFLs):** CFLs are small fluorescent tubes bent into compact shapes. Most CFLs come with an integral ballast, but two-piece designs have a separate ballast that lasts through four or five lamps (40,000 to 50,000 hours).

**ENERGY STAR:** U.S. government program that identifies energy-saving products. Get more information at [www.energystar.gov](http://www.energystar.gov) or call 1-888-star-yes (1-888-782-7937).

**Lumen:** Measures the total light output of a bulb. The higher the lumen output, the brighter the bulb.

**Lumens per watt (LPW):** Higher LPW bulbs are more efficient, much like a car that gets more miles per gallon.

**Watt:** The amount of power needed to operate a lightbulb. Watts equal power in, not light out.

**T5, T8, T12, etc.:** Fluorescent tubes of different diameters. The “T” stands for tubular; the number is tube diameter in 1/8-inch increments. A T5 has a diameter of 5/8 of an inch and fits in shallow spaces such as under a kitchen cabinet. T8s are generally more efficient than the standard T12 tubes.

## Resources/references

### Cash-Back Rewards

[www.focusonenergy.com](http://www.focusonenergy.com)  
1-800-762-7077

### Lighting design

*The Lighting Pattern Book for Homes* by Russell P. Leslie and Kathryn M. Conway. (MGE purchased several copies for libraries in our service territory.)

*Ideas for Great Home Lighting* by Scott Atkinson and the Editors of Sunset Books

American Lighting Association (ALA)  
Phone: 1-800-274-4484  
[www.americanlightingassoc.com](http://www.americanlightingassoc.com)

The ALA provides information on the energy-efficient use of lighting for consumers, businesses and industry personnel. The ALA consists of lighting manufacturers, their marketing representatives and lighting showroom distributors.

## **Manufacturers**

GE Lighting

[www.gelighting.com](http://www.gelighting.com)  
1-800-435-4448

Lights of America

[www.lightsofamerica.com](http://www.lightsofamerica.com)  
1-800-321-8100, Ext. 222

MaxLite

[www.maxlite.com](http://www.maxlite.com)  
1-800-555-5629

Panasonic Lighting

[www.panasonic.com](http://www.panasonic.com)  
1-866-292-7292

Philips Lighting

[www.nam.lighting.philips.com/us/](http://www.nam.lighting.philips.com/us/)  
1-800-555-0050

Sylvania (Osram Sylvania)

[www.sylvania.com](http://www.sylvania.com)  
1-800-544-4828

Technical Consumer Products Inc. (TCP)

[www.springlamp.com](http://www.springlamp.com)  
1-800-324-1496

Westinghouse Lighting (formerly Angelo Brothers/ABCO)

[www.westinghouselighting.com](http://www.westinghouselighting.com)  
1-888-417-6222

## **MGE's lighting Web page**

[mge.com/home/appliances/lighting](http://mge.com/home/appliances/lighting)

## **Preventing light pollution/protecting dark skies**

[www.rabweb.com/friendly](http://www.rabweb.com/friendly)  
[www.darksky.org](http://www.darksky.org) (also has good links to other lighting information)

## **Lighting for older adults**

*Lighting the Way: A Key to Independence* by Mariana Gross Figueiro  
[www.lrc.rpi.edu/programs/lightHealth/AARP/](http://www.lrc.rpi.edu/programs/lightHealth/AARP/)

## **Energy-efficient lighting**

[www.eere.energy.gov/consumer/your\\_home/lighting\\_daylighting/index.cfm/mytopic=11980](http://www.eere.energy.gov/consumer/your_home/lighting_daylighting/index.cfm/mytopic=11980)

## **ENERGY STAR®**

[www.energystar.gov/index.cfm?c=lighting.pr\\_lighting](http://www.energystar.gov/index.cfm?c=lighting.pr_lighting)

## **Listening. Learning.**

MGE takes responsibility to provide information and education to serve our customers and stakeholders. We educate customers today to help inform their decision making. We educate tomorrow's stakeholders so they can help plan our energy future.

responsibl**e**ducation

If we all replace one incandescent bulb with a compact fluorescent, we'll save enough electricity to power 1,800 homes.  
*Working together we can make a difference.*

Contact us for information about:

- Heating/Air-conditioning.
- Insulation/Weatherization.
- Windows/Doors.
- Appliances.
- Water heating.

Get more home energy information at:

- [mge.com/home](http://mge.com/home).
- Home Energy Line 608-252-7117.
- 1-800-245-1125.

 printed on recycled paper

**mge**<sup>®</sup>

your community energy company