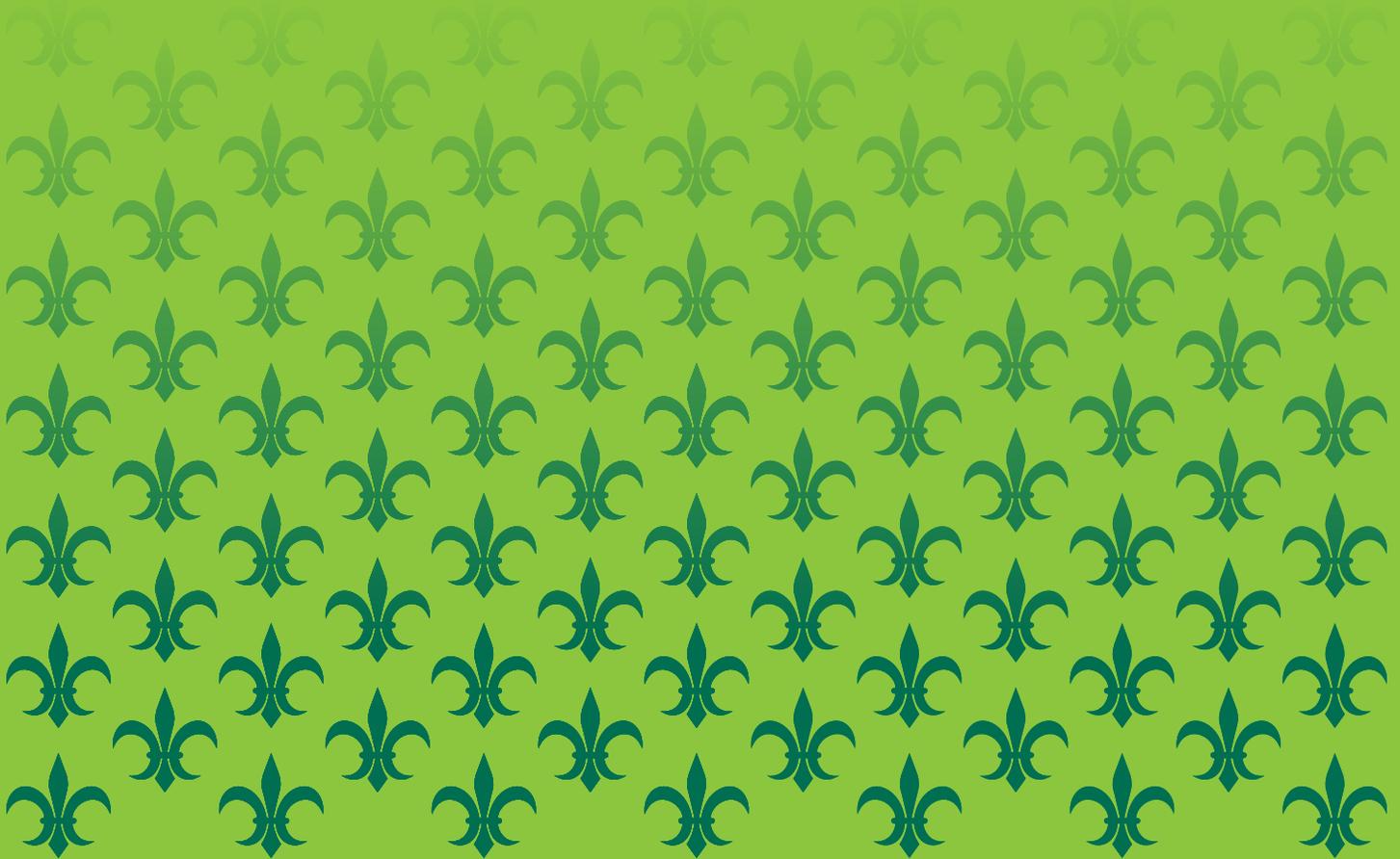


# The Lights in Your Home



Energy Smart is a comprehensive energy efficiency program developed by the New Orleans City Council and administered by Entergy New Orleans, LLC.  
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## THE LIGHTS IN YOUR HOME

Today we are going to examine one of the most important resources in our lives. It's the resource that allows our homes to be comfortable and bright, gives us a level of convenience never seen before in history, and makes its way into almost everything we do. That resource is energy.

Energy is, as scientists say, **the ability to do work**. Any time something is moving, heating up, making noise, growing, or changing in any other way, energy is present. Usually, we don't think about energy unless we suddenly can't use it. Mostly, adults think about energy use when they have to pay bills. So, let's give it some thought, shall we?

**Energy efficiency** is the process of using energy more wisely – in other words, doing more work while using fewer resources.

### In this packet:

In this packet, you'll find a bunch of interesting activities about one major area of home energy use: **Lighting**. We sometimes call our energy bill a light bill, but lighting only takes up about 9-12% of home energy use. Still, that means that using less light can save our families significant amounts of money and lessen your harmful impact on the environment.



**Using less light can save our families significant amounts of money and lesson your harmful impact on the environment.**





## ACTIVITY 1 • Essential Questions

Let's see what your thoughts are on some of these. You can look up the answers or take your best guess and test your knowledge.

What are some ways to save energy at home?

Why are LED bulbs more efficient than CFL and incandescent bulbs?

Who is the energy provider in our city?

How do electric lights impact our lives?

What type of light bulb do you have in your home?

### K • W • L

You're about to do what's called an "audit." Basically, that means you're going to investigate what's going on. Right now, our audit is focused on the lights in your home, which you probably haven't given much thought. Before you begin, fill out the first two parts of this KWL chart to figure out where you are in terms of lighting knowledge.

What I Know	What I Want to Learn	What I Learned
K	W	L



## ACTIVITY 2 • Home Light Audit

An audit is a deep look into what's going on in a situation. Your task is to audit the lights in your home. But in order to see what's going on, you need some information. Read this short article on the different kinds of light bulbs you may find in your home.

### Comparing LED vs. CFL vs. Incandescent Light Bulbs

Over the years, advances in technology have brought about innovations in how to light our homes and commercial buildings. In the beginning, all we had was the standard incandescent light bulb. Now we have compact fluorescent lamps (CFL) and light-emitting diodes or LED for short. We are going to tackle the question... which light bulb type reigns supreme? There are many variables, so let's dig in!

**Brightness:** Which bulb is brighter?

**Lifespan:** Which bulb lasts longest?

**Cost:** Which bulb costs less?

This comparison between candlelight, incandescent bulbs, CFL and LED light bulbs shows the lifespan difference as well as efficiency and color rendering.



## LED VS CFL Brightness

Are LED lights brighter than or equal to Compact Fluorescent (CFL) bulbs? The trick is to understand the technology. In short, LED and CFL, as technologies, do not have a difference in brightness intrinsically. Brightness is determined by lumens. Lumens are best described as the measurement of light. A single CFL and LED bulb might have the same lumen (brightness) output but vary greatly in the amount of energy needed to generate that level of brightness.



## Lumens & Wattage Comparison

The chart below illustrates the amount of brightness in lumens you can expect from different wattages of light bulbs. LED bulbs require much less wattage than CFL or incandescent light bulbs, which is why LEDs are more energy-efficient and longer lasting than their competitors.

How to understand this table - look at the lumens (brightness) in the far-left column, then compare how many watts of power each light bulb type requires to produce that level of brightness. The lower the wattage needed, the better.

Lumens (Brightness)	LED Watts (Viribright)	CFL Watts	Incandescent Watts
400-500	6-7W	8-12W	40W
650-850	7-10W	13-18W	60W
1000-1400	12-14W	18-22W	75W
1450-1700+	14-20W	23-30W	100W
2700+	25-28W	30-55W	150W

To compare different light bulbs, you need to know about lumens. Lumens, not watts, tell you how bright a light bulb is, no matter the type of bulb. The more lumens, the brighter the light. Labels on the front of light bulb packages now state a bulb's brightness in lumens, instead of the bulb's energy usage in watts. When shopping for your next light bulb, simply find the lumen output you're looking for (the bigger the brighter) and choose the bulb with the lowest wattage (the lower the better).

## Are CFL or LEDs more cost-effective?

To examine the cost comparison, let's look at a standard 60-watt replacement incandescent bulb in this example. The energy consumption to use a bulb like this would cost about \$90 over the course of 10 years. For an LED, running over the course of 10 years, the actual cost would be only \$18 to operate. Look at the table below for a breakdown.

LED vs CFL vs Incandescent	Incandescent	CFL	LED
Watts used	60W	14W	40W
Average cost per bulb	\$1	\$2	\$4 or less
Average lifespan	1,200 hours	8,000 hours	25,000 hours
Bulbs needed for 25,000 hours	21	3	1
Total purchase price of bulbs over 20 years	\$21	\$6	\$4
Cost of electricity (25,000 hours at \$0.15 per kWh)	\$169	\$52	\$30
Total estimated cost over 20 years	\$211	\$54	\$34



### Winner: LED (in the long run)

The above chart shows a clear-cut winner when considering the price over time with energy consumption factored in. In addition to LED's cost savings, there are also government-backed rebates in some scenarios for Energy Star® products.

## Do CFL or LED bulbs last longer?

Quick Answer: LED

Lifespan Challenge	Incandescent	CFL	LED
Average Lifespan	1,200 Hours	8,000 Hours	25,000 Hours

Although LED technology for use in bulbs has not been on the market for long, the lifespan estimates for the new technology are astounding and leave CFL and incandescent with little to show for in comparison. With an astonishing lifespan of 25,000 hours, LED light bulbs are the undisputed, heavyweight champion in longevity. The next best are CFL bulbs which bring in a respectable 8,000 hours of average life expectancy. Keep in mind, most tests are based on a running time of 3 hours per day.

**Now that you know what to look for, let's find out what's going on in your house.**

**Instructions**



Take this sheet and something to write with and walk around your house. Take note of every single light bulb and record information about it in the table below, using tally marks. Refer to these images to see what kind of bulb you have.

INCANDESCENT



CFL



LED



WHAT LIGHT BULBS DO YOU HAVE? WHERE ARE THEY?			
	Incandescent	CFL	LED
Kitchen			
Living room			
Bathrooms			
Bedrooms			
Closets/storage			
Porch			
Hallways			
Other			
<b>Total</b>			
<b>Total Number of Light Bulbs:</b>			



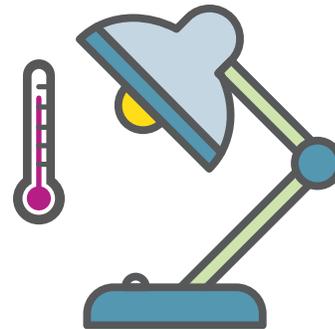
## ACTIVITY 3 • Test it For Yourself

All sorts of plants, animals, and fungi can create light without creating heat. But we humans haven't figured that trick out yet. Every light bulb works by heating up more and more until the bulb can't contain any more heat, and then it lights up. But remember, heat is a form of energy. And we don't need the bulbs for heat, we need them for light. So, the more heat a bulb requires to light up, the more energy is being wasted. Each newly invented bulb requires less heat than the previous bulbs.

**Which bulb requires the most heat to light up?**

### For this experiment, you'll need:

- A small lamp or other light socket you can reach.
- One of each type of bulb that you have in your house. (Please do not go out to buy new bulbs.)
- A thermometer if you have one. (Please do not go out to buy a thermometer.)
- This sheet and something to write with.



**STEP 1** Once you have collected your supplies, set them up together. Make sure your lamp is plugged in safely.

**STEP 2** Information about light bulbs is written on the bulbs themselves. While each bulb is still unplugged, look for the following information:

**Number of lumens (may be listed as “luminosity”).**

**Number of Watts (shown as a number followed by a “W”).**

With your lamp off, screw in the first bulb. Then, turn the lamp on. If you're using an incandescent bulb, test it last.

**STEP 3** Take a thermometer and hold it next to the bulb for one minute. Then, turn it off and record the temperature. If you're not using a thermometer, hold your hand about 6 inches from the bulb for a minute. Record how the bulb feels according to your observations.

Type of bulb: \_\_\_\_\_ Wattage: \_\_\_\_\_ Lumens: \_\_\_\_\_

Temperature and/or observations: \_\_\_\_\_

## STEP 4

Switch out the first bulb for the second and repeat: Hold the thermometer to the bulb for one minute, then turn the lamp off. Record the temperature or your observations.

Type of bulb: \_\_\_\_\_ Wattage: \_\_\_\_\_ Lumens: \_\_\_\_\_

Temperature and/or observations: \_\_\_\_\_

## STEP 5

If you've got a third bulb, switch it out, too. If you are concerned that the bulb you're taking out of the lamp is too hot, wait as long as necessary for it to cool down before touching it. Better safe than sorry.

Type of bulb: \_\_\_\_\_ Wattage: \_\_\_\_\_ Lumens: \_\_\_\_\_

Temperature and/or observations: \_\_\_\_\_

Repeat the experiment for as many different bulbs as you choose to use. You can record extra observations on scrap paper.

## STEP 6

Answer the following questions about this experiment:

1. Which type of bulb produced the most heat? \_\_\_\_\_

2. Were the hotter bulbs brighter? \_\_\_\_\_

3. How do you feel about the bulbs your family is using?

Would you like to switch? If so, what kind of bulb would you recommend your family switch to? \_\_\_\_\_



## ACTIVITY 4 • Read the Article

### 10 Reasons Why LED Lights are Good for the Environment

From [www.environment.co.za](http://www.environment.co.za), June 17, 2016

It was not until recently that people have started thinking about environmental conservation. Today, many people are aware of the seriousness of this matter and are consciously trying to protect the environment by changing their choices and priorities.

While there can be many ways to help protect the environment, one very effective way is to choose environmentally friendly lights for your home or workspace. And when it comes to environmentally friendly lighting, what can be better than the LED lights!

In case you are wondering why, here is a list of reasons why LED lights are regarded as the most environmentally friendly lights among all the available options.

#### 1 | LED Lights are Energy Efficient:

LED panel lighting is highly energy efficient and can save around 90% of electricity as compared to incandescent, or old-fashioned, lights and 50% as compared to CFLs, or compact fluorescent lights. Low energy consumption reduces the load on electric power plants, which in turn reduces the amount of fuel being burned to create electricity.

#### 2 | LED Lights Reduce Light Pollution:

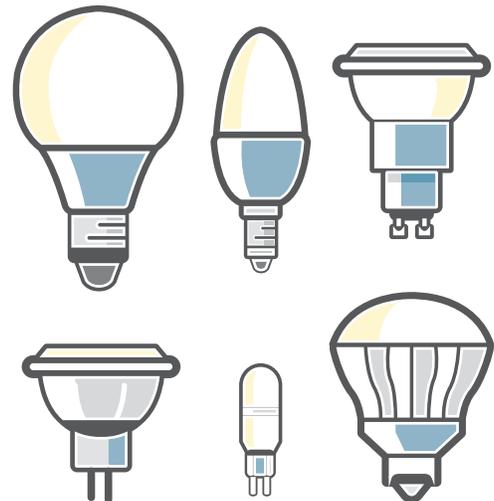
LED lights have “inherent directional nature,” which means that their light is highly focused. Old-fashioned incandescent lights send light in every direction, which can be bad for wildlife in our cities, and prevents us from seeing the stars. LED lights reduce this “light pollution” by reducing the unwanted scattered light in the environment.

#### 3 | LED Lights Emit Negligible Heat:

One of the most environmentally friendly aspects of LED lighting is that these lights have very high electricity-to-light conversion efficiency, as high as 90% in most cases. That means that more of the energy they use becomes light, and far less of it becomes heat. An old-fashioned incandescent uses 90% of its energy on heat. An LED uses almost none.

#### 4 | LED Lights Have a Long Life:

LED lights have a rated life of 30,000 to 50,000 hours, which is many times greater than their conventional counterparts. This longer lifespan means you don't have to replace the bulbs as often, which saves you money and creates less trash going to landfills.



LED lights are regarded as the most environmentally friendly lights among all the available options.



## Know Your Terms

**Instructions:** Look up the following terms from the article, *10 Reasons Why LEDs Are Good for the Environment*, and write down what they mean.

Conservation:

Incandescent:

Light-emitting diode:

Compact fluorescent lamp:

Efficient:

Light pollution:

Noise pollution:

Greenhouse gas:

Emission:

### 5 | LED Lights are Safer:

LED lights are amazingly durable. They are completely sealed and are highly resistant to vibrations, impact, and harsh weather conditions. Moreover, there are no glass parts and, hence, no risk of serious injury in case a bulb breaks. They also do not contain mercury, like CFLs do.

### 6 | LED Lights Do Not Add Noise to the Environment:

Unlike other lighting technologies, LED lights are designed in such a way that they do not generate any vibration or humming noise. So, by replacing incandescent light bulbs with LEDs, one can help reduce noise pollution from the environment. People who are sensitive to the buzzing of fluorescent bulbs also find them less annoying.

### 7 | LED Lights Do Not Draw Insects and Bugs Toward Them:

Especially in outdoor lighting, insects and bugs can pose a serious problem as they are attracted to incandescent light bulbs. The main reasons behind this are the hot bulb surface and specific wavelength of the light, both of which are absent in LED bulbs. So, you can get rid of the annoying bugs and insects by switching to LED lights. Since bugs are so important to our ecosystem, it also means you're protecting the environment.

### 8 | LED Lights are Good for Plant Growth:

Research suggests that the presence of incandescent bulbs can have a bad impact on plant growth because these bulbs increase the temperature of the area. Garden LED lighting, on the other hand, is actually good for them as they provide cool light.

### 9 | LED Lights Do Not Accumulate Harmful Chemicals in the Environment:

Unlike the compact fluorescent lights which have 4 to 5 milligrams of mercury, LED lights are free of any chemical that can be hazardous for the environment or public health.

### 10 | LED Lights Have a Smaller Carbon Footprint:

Greenhouse gas emissions associated with LED lights are far less than incandescent or compact fluorescent lights. According to careful calculations, one LED bulb, providing the same amount of light as one incandescent bulb, emits 80% less greenhouse gases and 50% less than CFLs.



## ACTIVITY 5 • How Much Does My Family Spend on Lighting?

How much does your family spend to light your home, and how can you reduce that amount? Let's find out.

### STEP 1 Locate your energy bill.

Ask the adults at home where the bill is and if you can take a look at it. If your family doesn't pay the energy bill (say, for example, if your landlord pays it), then you can either ask them to guess how much the bill is, ask another family member, or skip this activity.

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Service Location  
XXXX XXXXXXXXXX  
XXXXXXXX, XX XXXXXX

Customer Service, 800-368-3749 (800-ENERGY)  
Residential: 7a-7p; Business: 8a-6p; Mon-Fri  
Power Outage or Safety Concern, 24 hrs/7days  
800-468-8243 (800-POUTAGE)

Billing Period	Billing Days	kWh Used	Avg kWh Per Day	Cost
Oct 2000	XX	XXXX	XXX	XXXX
Oct 2000	XX	XXXX	XXX	XXXX

**Account Summary for XXXXXXX XXXXX**

Account#	Mail Date	GPC
XXXXXXXXXX	10/01/2000	XXXX
Invoice #	Cycle	
XXXXXXXXXXXXXX	XX	
<b>Amount Due by 10/01/2000</b>		<b>\$XXXX.XX after \$XXXX.XX</b>

**Account Detail**

Previous Balance	XXXX.XX
Late Payment Charge	XX.XX
Payment Received (10/01/2000)	-XXXX.XX
Payment Received (10/01/2000)	-XXXX.XX
<b>Remaining Balance</b>	<b>\$X.XX</b>

**Current Charges**

Energy Charge	XXXX.XX
Storm Restoration Offset	-XX.XX
Fuel Adjustment	XXXX kWh @ \$X.XXXX = XXX.XX
Federal Mandate/EAC Rider	XXXX kWh @ \$X.XXXXX = XX.XX
Municipal Franchise Fee	XX.XX
<b>Total Metered Charges (Contract XXXXXXX)</b>	<b>\$XXXX.XX</b>
Storm Restoration Charge	XX.XX
<b>Current Month Energy Charges</b>	<b>\$XXXX.XX</b>
<b>Total Amount Due</b>	<b>\$XXXX.XX</b>

**Meter Reading (Contract XXXXXXX)**

Meter #	XXXXXX	Rate: LA_RS
Total Days (XX)		
Current Meter Reading	(XXXXXX)	XXXX
Previous Meter Reading	(XXXXXX)	- XXXX
<b>kWh Metered</b>		<b>XXXX</b>

**STEP 2 Let's read that bill**  
Not everything in your energy bill is purely for the energy you use at home. Some of it is fees for other services. Look at the line that says, "Energy Charge" or "Electric Base Rate Charge."

### STEP 3 Now that you've located the amount of money your family spends on energy, take stock of your light bulbs. What kind of bulb does your family mostly use?

- LED
- CFL
- Incandescent

If you use mostly incandescent bulbs, that means about 20% of your energy base rate goes to light.

If you use mostly CFLs, that means about 7% of your bill goes to light.

**STEP 4** Calculate how much you spend on lighting:

A) If you use mostly incandescent bulbs: Energy charge x 20% = \_\_\_\_\_

B) If you use mostly CFLs: Energy charge x 7% = \_\_\_\_\_

This is what your family spends each month to light up your home.

**STEP 5** LED bulbs use about 16% of the energy that incandescents use and about 60% of the energy that CFLs use. Choose the equation that makes sense for you to calculate what you would spend if you switched to LEDs:

A) If you use mostly incandescent bulbs: Your lighting costs x 16% = \_\_\_\_\_

B) If you use mostly CFLs: Your lighting costs x 60% = \_\_\_\_\_

This is what your new cost would be if your family switched to LED bulbs.

**STEP 6** The answer to step 5 is the amount of money your family would spend on lighting if you used LEDs instead of incandescents or CFLs. How much would you save each month? Subtract your answer from step 5 from your answer from step 4.

**STEP 7** How much would you save in a year? Multiply your monthly savings from step 6 by 12.

**STEP 8** What would your family do with the money that you've saved from changing out your light bulbs? Have a conversation with them! Write about it here.

**STEP 9** So much of energy efficiency is about what we do in our homes, as much as what we have. What can you do at home to save money on lighting?





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REFERENCES [www.thespruce.com/are-phantom-loads-adding-to-your-electric-bill-1388205](http://www.thespruce.com/are-phantom-loads-adding-to-your-electric-bill-1388205)

