ECU SUSTAINABLE ENERGY AND ENVIRONMENTAL ENGINEERING

Energy Efficient Lighting:

As traditional incandescent light blubs are phased out, the use of LED's (Light Emitting Diode) and CFL's (Compact Fluorescent Light) are the bright future for the lighting of your house or rental property.

What are your lighting options? Traditional incandescent light bulbs while cheap, are inefficient at converting energy into light and produce excessive amounts of heat when it comes to lighting your house. Another option would be Compact fluorescent lighting, CFL, which provide adequate lighting for just a little more than traditional bulbs. The best option would be the LED (light emitting diode) light blubs which allow for great instantaneous lighting with very little heat. LED light bulbs demonstrate incredible levels of energy efficiency and longevity, but are priced higher than most other light bulbs.

Why change to efficient lighting?

With lighting consuming 15% of a households electricity, changing to energy efficient lighting is a money saver. Comparing traditional, CFL, and LED light bulbs we begin to see the potential savings.

Comparisons between Traditional Incandescent and Energy-Efficient Light bulbs

	60W Traditional Incandescent	43W Energy-Saving Incandescent	15W CFL	12W LED
Energy Saved (%)	—	~25%	~75%	~75-80%
Annual Energy Cost*	$4.80	$3.50	$1.20	$1.00
Bulb Life	1000 hours	1000 to 3000 hours	10,000 hours	25,000 hours

*based on 2hrs/day of usage, an electricity rate of 11 cents per kilowatt-hour. Shown in U.S. dollars.

CFL benefits and downfalls

Benefits of ENERGY STAR qualified CFL's when compared to incandescent light bulbs:

- Use about one-quarter of the energy to produce the same amount of light.
- Last about 10 times longer.
- Produce about 75% less heat, which reduces cooling costs.
- Save about $30 or more in electricity costs over the lifetime of the bulb.
- Have manufacturer-backed warranties, and meet strict energy efficiency and performance requirements.

The negatives of CFL light bulbs:

- Contain small amounts of mercury, requires special cleanup and disposal.
- Lighting is not always instantaneous.

What's the Difference?

Type of Bulb	 Incandescent	 Fluorescent
Power Used (Watts)	60	13
Light Output (Lumens)	800	800
Lifetime (Hours)	750-1,000	6,000-15,000
Lifecycle Cost*	$40	$10

*Based on a 6,000-hour CFL, a 1,000-hour incandescent, use of 3 hrs/day, 11.09 cents/kWh electric rate, $3.00 CFL, and $0.50 incandescent.

The facts on LED's

- The LED's are used in traffic lights, car brake lights, and even TV's due to compact size, ease of maintenance, and resistance to breakage.
- Quality LED's have a life time of 25,000 hours or more. This is 25 times longer than traditional blubs.
- LED's do not contain mercury and have a much smaller impact than incandescent bulbs.
- The LED's of today are 67% more efficient than conventional light bulbs and can cut energy use by more than 80%.
- In 2012, roughly 49 million LEDs were installed

The Price of Efficient Lighting

Comparing common light bulbs in todays market, we can see the cost per year for bulbs with 800 lumens:

- A 60W incandescent light bulb costs $7.32 per year.
- A 43W incandescent halogen light bulb costs $5.18 per year.
- A 13W ENERGY STAR CFL light bulb costs $1.57 per year.
- A 12.5W ENERGY STAR LED light bulb costs $1.50 per year.

While LED light bulbs have a much higher initial investment cost than either traditional incandescent light bulbs or compact fluorescent, looking at the long term cost savings makes LED's a feasible alternative.

- 75 watt halogen bulbs (typical recessed lighting bulb)
  - 2,000 hour lifespan
  - $61 per year in energy costs with
- 9 watt LED light bulbs
  - 35,000 hour lifespan
  - $8 a year in energy costs
- Replacing 100 halogen bulbs with LED bulbs will result in $26,000 in energy savings over five years.

LED's vs. CFL's: A light on your invest-

Both LED and compact fluorescent light bulbs (CFLs) have advantages and disadvantages for your lighting needs. This comparison will help to show you why LED's can be a truly revolutionary lighting source.

LED

- **50,00 hour lifespan**
- **6-8 watts**
- **451 lbs. CO_2 per year**
- **Turns on instantly**
- **Does not contain mercury**
- **Very durable**
- **Emit 3.4 BTU's/hr of heat**

CFL

- **8,000 hour lifespan**
- **13-15 watts**
- **1051 lbs. CO_2 per year**
- **Needs time to warm up**
- **Contains toxic mercury**
- **Fragile, Easily broken**
- **Emit 30 BTU's/hr of heat**

Installing Energy Efficient Lighting[1]	
Average Annual Savings	$140.33
Average Impl. Cost	$134.92
Average Payback Period (Years)	1.06
Average Net Present Value[2]	$783.84

1: Does not include installation costs
2: Assuming a discount rate of 1.7% compounded annually. Lifespan used for lighting is 7 years. Discount rate is based on 2012 inflation rate of 1.7%:

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