



Opportunities in Sustainability:

## **Enter At The Exit**

Quick Return On Investment  
With LED Exit Sign Lighting

Opportunity  
Sustainability<sup>sm</sup>



If you want to enter the sustainability/green world, enter at the exit. In many ways, this is how the whole sustainability movement got started. Recycling is really about rethinking an exit – waste.

## Opportunities in Sustainability: Enter At The Exit

As a sustainability consultancy there are two things we notice when we walk into a customer's office/building. First, how many and what kind of light fixtures they have. Second, how many exit signs they have. General lighting is an obvious choice for sustainability, we've all been changing our bulbs at home to CFLs. You may be asking however, why exit signs.

### Did you you know?

- ➔ The average exit sign costs a company **\$77** a year to operate.
- ➔ Switching to LED light bulbs will drop that to **\$5.26** per year.  
(**\$71.74** in annual savings)

That's a **93%** operational cost savings for the company. AND, that's just for ONE exit sign - what if you have 5, 10, or 100?

### Where else can you cut costs like that?

Updating your exit signs to use LEDs will, in most cases, save your company more than enough money in the first year alone to cover an in-office consulting visit.

When looking for opportunities in sustainability, some of the greatest cost reduction and economic bottom line opportunities are found in simple elements that we take for granted, like exit signs.

### Summary of Operational Cost Comparisons

	Bulb Set Costs	Ave Bulb Lifetime	Sets per year	Total Bulb Cost	Labor/ bulb set	Total Labor/ year	Hourly Energy Usage	Hours per year	Annual Energy usage	Cost per kWh	Annual Energy Cost	Total Annual Cost
<b>First Year</b>												
Incandescent	\$4.00	2750 hrs	3	<b>\$12.00</b>	\$10.00	<b>\$30.00</b>	40 Watts	8760	<b>350.4kWh</b>	\$0.10	<b>\$35.04</b>	<b>\$77.04</b>
LED	\$20.00	100,000 hrs	1	<b>\$20.00</b>	\$10.00	<b>\$10.00</b>	3 Watts	8760	<b>26.28kWh</b>	\$0.10	<b>\$2.63</b>	<b>\$32.63</b>
<b>Ongoing Cost per year 2<sup>nd</sup>-11<sup>th</sup> Year</b>												
Incandescent	\$4.00	2750 hrs	3	<b>\$12.00</b>	\$10.00	<b>\$30.00</b>	40 Watts	8760	<b>350.4kWh</b>	\$0.10	<b>\$35.04</b>	<b>\$77.04</b>
LED	\$0.00	100,000 hrs	0	<b>\$0.00</b>	\$10.00	<b>\$0.00</b>	3 Watts	8760	<b>26.28kWh</b>	\$0.10	<b>\$2.63</b>	<b>\$2.63</b>

## Here's the math and an explanation.

Traditional exit signs use 2 x 20 Watt incandescent bulbs. By law in most US regions, for public safety, these signs must be lit 24 hours a day, 7 days a week, 365 days a year.

### Operational Costs for Incandescent Exit Signs

#### **Electricity Costs:**

2 bulbs x 20 Watts = 40 Watts x 24 hours = 960 Watt hours (0.96 kWh) daily  
960 X 365 days per year = 350,400 Watt hours (**350.4** kWh) annually

Electricity is billed in terms of kilowatt hours (kWh). To convert Watt hours to kilowatt hours (kWh), divide Watt hours by 1,000. In the US, the [average commercial cost](#) of a kWh is \$0.10

350.4 kWh x \$0.10 per kWh = **\$35.04** in annual electricity cost per exit sign.

*But don't stop there, electricity is not the only cost of operation for an exit sign, though that price tag alone should give you pause. Let's look at those other costs.*

#### **Bulb Costs:**

20 Watt incandescent exit sign bulbs can be purchased in bulk for approximately \$2 each. Most signs have 2 bulbs per unit. 2 x \$2 = **\$4**

Incandescent bulbs last approximately 2500-3000 hours and a year has 8760 hours, which means the bulbs have to be replaced an average of 3x each year.  
3 x \$4 = **\$12**

#### **Labor Costs:**

Bulbs don't replace themselves so we have to add the labor cost.

Whether you pay a maintenance service or use one of your own employees, figure a minimum of a 1/2 hour maintenance labor fee charge of **\$10** per change.

\$10 x 3 a year = **\$30**

*Let's add up the operating costs for an incandescent exit sign*

**Annual Cost:** (Operating Cost per year per exit sign)

**\$35** in energy + **\$12** in bulbs + **\$30** in labor = **\$77** per year PER SIGN

***So, how many exit signs are in your building?***

***What is that costing you?***

## Have you thought about LEDs?

A typical LED exit sign operates using only 3 Watts of electricity. The life expectancy of an LED sign is over 100,000+ hours (in continual use that is 11.4 years).

Aren't they expensive? While the LED replacement bulbs are more expensive at the front end, the investment starts paying dividends within 6 months.

### Operational Costs for an LED Exit Sign

#### **LED Electricity Costs:**

2 bulbs x 1.5 Watt = 3 Watts x 24 hours = 72 Watt hours (0.072 kWh) daily  
72 x 365 days = 26280 Watt hours (26.28 kWh) yearly  
26.28 kWh x \$0.10 per kWh = \$2.63/yr

#### **LED Bulb Costs:**

LED exit sign replacement bulb kits with 2 bulbs average **\$20**  
LED bulb kits last approximately 100,000 hours and a year has 8760 hours,  
which means the bulbs last approximately 11.4 years  
Amortized over 11.4 years the bulb cost = **\$1.75** per year

#### **LED Labor Costs:**

Whether you pay a maintenance service or use one of your own employees,  
figure a minimum of a 1/2 hour maintenance labor fee charge of **\$10**.  
Replacement LED bulbs last approximately 100,000 hrs (approx. 11.4 yrs)  
Amortized over 11.4 years the labor costs = **\$0.88** per year

*Let's add up the LED exit sign operating costs.*

#### **LED Annual Cost:** (Operating Cost per year per exit sign)

##### **First Year:**

**\$2.63** in energy + **\$20** in bulbs + **\$10** in labor = **\$32.63**  
*(that's already less than pre-existing energy costs alone)*

##### **Next 10 years:**

**\$2.63** in energy + **\$0** in replacement bulbs + **\$0** in ongoing labor = **\$2.63**

#### **Average annual cost using amortized bulb & labor costs:** (over 11.4 years)

Bulb cost \$20/11.4 years = \$1.75

Labor cost \$10/11.4 years = \$0.88

**\$2.63** in energy + **\$1.75** in bulbs + **\$0.88** in labor = **\$5.26** per year PER SIGN

*Switching to LED bulbs creates an annual savings of **\$71.78** per sign*

## Long-term Cost Savings:

### LED Exit Sign Lifetime Costs And Savings

	Bulb Set Costs	Ave Bulb Lifetime	Bulbs sets used	Total Bulb Cost	Labor/bulb set	Total Labor	Hourly Energy Usage	Lifetime Energy usage	Cost per kWh	Lifetime Energy Cost	Total Lifetime Cost
Incandescent	\$4.00	2750 hrs	34.2	\$136.80	\$10.00	\$342.00	40 Watts	3,994.56kWh	\$0.10	\$399.46	\$878.26
LED	\$20.00	100,000 hrs	1	\$20.00	\$10.00	\$10.00	3 Watts	299.59kWh	\$0.10	\$29.96	\$59.96
<b>LED Lifetime Savings:</b>				<b>\$116.80</b>		<b>\$332.00</b>		<b>3694.97kWh</b>		<b>\$369.50</b>	<b>\$818.30</b>

Over the 100,000 hour lifetime of the LED Bulb your company will save **\$818.30**

This represents a **93%** operational cost reduction

### Implications:

- Most medium office/business incubator spaces have 4 of these exit signs. Switching to LED represents a yearly cost savings of \$287.12 or \$2,871.20 over 10 years.
- Typical restaurants have 6 exit signs. That's an annual savings of \$430.68 and over 10 years \$4,307.
- An office Building with 100 exit signs that switched to LED bulbs would save \$7,178 annually and \$71,780 over 10 years.

**How many exits are in your school, your apartment building, etc.?**

**If your building has stairwells, think of how many are in there.**

#### **BONUS:**

The initial exit sign replacement and/or bulb replacement with LED lighting in many markets is incentivized. Many states, counties, cities, and utility companies offer rebates for replacing these incandescent exit signs with LED signs/bulbs. Two resources:

- [Puget Sound Energy](#) is offering a rebate of up to \$50 for each exit sign lit by incandescent or fluorescent lamps that's replace with an an LED exit sign. See *program for details*.
- Database of State Incentives for Renewable Energy <http://www.dsireusa.org>

Additional Savings Note: *When upgrading to LED light bulbs, there is no need to buy a whole new sign, as you can buy bulb sets or kits that screw into the existing sockets. (See, we just saved you another \$30 and the landfill another perfectly good exit sign).*

## Other Exit Sign Options:

### Curious about using CFLs in exit signs? (Compact Fluorescent Lamps)

Exit signs typically require a U-Shaped CFL bulbs to fit the exit sign. Typical CFL exit lamps bulbs last 5-6,000 hours and consume 11 Watts of energy. With 8,760 hours in a year, these bulbs will need to be replaced multiple times a year - every 10-11 months.

### Operational Costs for a CFL Exit Sign

#### CFL Energy Costs:

11 Watts x 8760 hours = 96.36 kWh x \$0.10 = **\$9.64**

#### CFL Bulb Costs:

1.2 replacements a year at approx \$4 = **\$4.48** (note: At time of writing, we were unable to easily find replacement CFL exit sign bulbs online.)

#### CFL Labor Costs:

1.2 replacements a year x \$10 = \$12

#### CFL Total Annual Cost:

**\$9.64** energy + **\$4.48** bulbs + **\$12** labor = **\$26.12**

#### Lifetime Total Costs: (compared to LED)

\$26.12 x 11.4 years = **\$297.77**

## Two Additional Exit Sign Options:

### Tritium Signs

Tritium signs contain the radioactive gas tritium and therefore are regulated, monitored, and must be disposed of properly. Typical costs: \$225 for the sign which will last 10 years + installation + disposal fee currently around \$75. More info: <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-tritium.html>

Upside? These signs remain on during extended power outages.

Downside? Unfortunately, many are not disposed of properly (It is illegal to dispose of them in your standard city waste stream). This has the potential of creating fines and additional corporate risks associated with the radioactive waste in ground water.

### Photo-luminescent Signs

Think – “glow in the dark” signs. These signs are dependent upon ample daytime lighting to charge the material. Essentially you are paying for the power another way, unless solar-powered by the sun. In addition, without sufficient charge, the exit may not be locatable during an emergency, thus defeating the purpose of the sign.

## Carbon Footprint Breakdown of Exit Sign Bulb Choices:

	Annual Carbon Dioxide (CO <sub>2</sub> ) Pollution
<b>LED</b>	72 lbs CO <sub>2</sub>
<b>Fluorescent/CFL</b>	230 lbs CO <sub>2</sub>
<b>Incandescent</b>	574 lbs CO <sub>2</sub>

LED replacement of incandescent bulbs represents a 87% reduction in GHG. 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. [Carbon calculations provided by EnergyStar](#)

### Conclusions: How did we do?

Sustainability is best measured by its impact: economic/environmental/social

#### Economic Impact

- 93% in ongoing operating cost (energy, bulbs, labor reduction)
- Reduced waste removal costs (bulbs, signs, packaging)
- Reduced liability risks due to safety violations\*

#### Environmental Impact

- Reduced waste in the form of replacement bulbs, their packaging, and thought-to-be-useless original exit signs.
- Reduced trips for the maintenance crew to come out and replace the bulbs every 3-4 months - thereby reducing the carbon footprint further.
- Lowered operational carbon footprint of sign by 87%.

#### Social Impact

- #1 impact – Safety – long term, consistent exit lighting.

Sustainability is smart business. It does not have to be complicated and often, tremendous impact can result from *simple, cost effective, and minor habit changes*. This LED case is just such an example of a simple change having dramatic economical, environmental, and social impacts for the business.

Sustainability is about rethinking the way we do things - rethinking with the end in mind – utilizing “wasted” opportunities. There are myriad opportunities in sustainability.

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[Opportunity Sustainability](http://www.OpportunitySustainability.com)<sup>SM</sup> is a Midwest-based sustainability and corporate responsibility consulting firm specializing in green innovation and seeing opportunities where others see burdens. Matthew Rochte LEED AP, an experienced, operations-based sustainability consultant, works with company management to navigate and realize the opportunities in taking their company green and growing sustainably.

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