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Efficient, Innovative Retail Solutions

Consumer Behavior

- Consumer preferences are always changing and retail stores must adapt to accommodate these needs.
- Consumer purchasing is influenced by a plethora of variables.
- The goal of the retail stores is to build an atmosphere that is conducive to customer purchasing.
- Atmospheres that convey a “pleasantness” and arouse emotions are shown to entice consumers to stay and spend increased time in that environment.
- Components involved in creating a retail atmosphere are those that arouse the senses:
 - Sight
 - Sound
 - Smell
 - Touch
 - Taste

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Consumer Behavior

- Manipulating the senses elicits emotions from the consumer.
- Proper manipulation will allow for the retailer to keep the consumer in a pleasant mood which makes them more inclined to stay and make purchases.
- To manipulate the senses the retailer can employ different tactics such as playing soothing music or using air fresheners to have a pleasant smell.
- These tactics tend to target one specific sense each and this can become very cost inefficient if the companies have to invest in different tactics.
- One tactic that would allow the companies to impact different senses either directly or indirectly would be the use of lighting.
- Proper lighting can impact multiple sense depending on the different ways that it is utilized.
- Research studies have been conducted on the topic of lighting and its impact on consumers as well as the impact on business.

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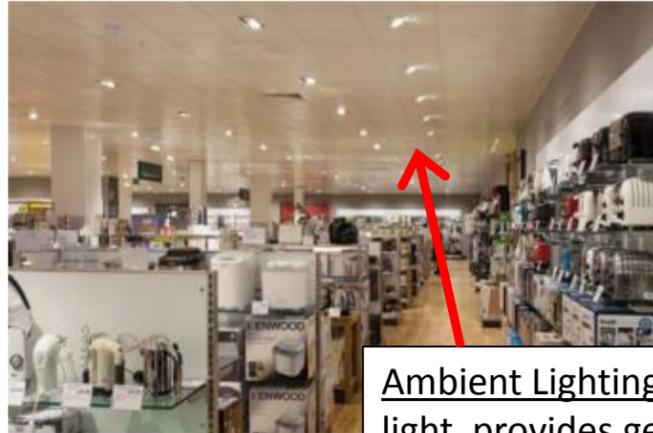
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Current Lighting Opportunities

Ambient Lighting



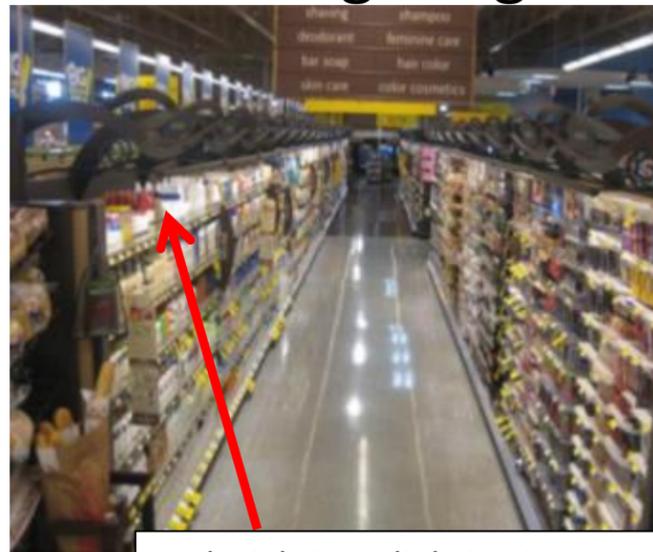
Ambient Lighting- The main source of light, provides general illumination to the entire store. Proper illumination is key in creating a friendly environment for consumers as well as employees.

Accent Lighting



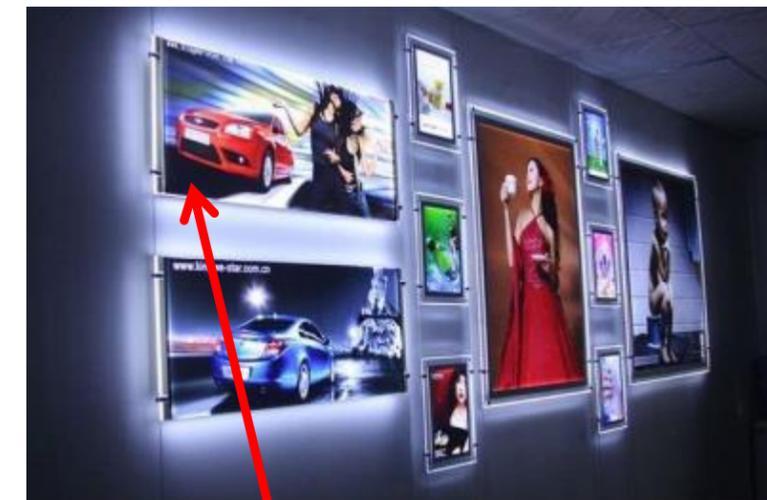
Accent Lighting- Additional lighting used to spotlight products within store, favorable lighting can increase the attractiveness for the product and entice the consumer to approach, examine and touch the product all of which will increase the likelihood that the consumer will purchase the product.

Task Lighting



Task Lighting - lighting in area where tasks are performed by either consumer or employee. This is key in creating positive reaction from consumer.

Decorative Lighting



Decorative Lighting - lighting used to draw in the consumer and bring attention to the brand of the store and leave an impression on the consumer.

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Lighting Importance

Table 2: Lighting Design Guide for Merchandising Spaces and Associated Areas

INTERIOR	* VERY IMPORTANT	◇ IMPORTANT	● SOMEWHAT IMPORTANT														
LOCATION AND TASKS																	
	Appearance of Space and Luminaires	Color Appearance (and Color Contrast)	Daylighting Integration on Surfaces	Direct Glare	Light Distribution on Surfaces	Light Distribution on Task Plane (Uniformity)	Luminance of Room Surfaces	Modeling of Faces or Objects	Point(s) of Interest	Reflected Glare	Shadows	Sparkle/Desirable Reflected Highlights	Surface Characteristics	System Control and Flexibility	Illuminance (fc) Circulation ¹	Illuminance (fc) General ^{2,4}	Illuminance (fc) Perimeter ³
Grocery/Supermarket	●	●	*		●	●								●	25-30	75-85	75-85
Discount	◇	◇	◇	◇	●	◇	◇		●	◇			●	●	25-30	75-100	75-100
Department	◇	*		◇	◇	◇	●	◇	◇	◇	◇	◇	◇	◇	20-25	40-50	50-75
Upscale Department	*	*		◇	◇	●	*	*	◇	◇	◇	*	◇	◇	15-20	30-40	40-80
Specialty Retailer	*	*	◇	◇	◇	◇	◇	◇	*	◇	*	*	◇	◇	20-25	40-50	50-75
Designer Shop/Boutique	*	*	◇	◇	*	◇	*	*	*	◇	*	*	*	◇	8-12	20-30	20-60
Jewelry/Crystal/China/Silver ⁵	*	◇	*	*	*	◇	*	*	*	*	*	*	*	◇	8-12	20-60	20-60
Drug and Convenience	◇	◇	●		◇		●	●		●			●		25-30	75-85	75-85
Home/Bath/Bedding	*	*	◇	●	*		*	◇	◇		◇		◇	◇	20-25	40-50	50-75
Furniture	*	*	◇	◇	*		*	◇	◇		◇		◇	◇	8-12	20-30	20-60

¹ Circulation is space not normally used for display or appraisal of merchandise (aisles, foyers, escalators)
² General is the common selling floor where merchandise is presented and routine appraisal occurs
³ Perimeter is the wall area where merchandise is appraised. Recommended illuminance is in the vertical plane.
⁴ For feature display areas, illuminance values are based on ratios between general and accent lighting of 5:1 and 10:1
⁵ The higher general illuminance value is for case work and label areas only.

The attached table shows the importance of lighting in different types of retail stores and different aspects of lighting

Case Studies—Impact of Lighting

- Case studies have been conducted to test the topic of altering retail environments to create a “consumer friendly” atmosphere.
- Studies have shown a correlation between usage of Lighting and increased product sales.
- Ex. Research conducted by Mars Chocolates North America on front end grocery sales:
 - Prior to Lighting solutions 59% of customers did not consider purchasing anything from the front end.
 - The installation of LED Lights to the front end racks helped improve the appeal of the products to customers, which led to the increase in front end sales by roughly 10-12%.



Case Studies—Impact of Lighting



- A case study was conducted by the National Lighting Bureau on Pillowtex Corporation (A textile company).
 - They retrofitted current lighting system in one of their showrooms to enhance product presentation.
 - In their case, it cost \$3000 to install the new lighting system and less than \$500 in maintenance.
 - The change was very beneficial to the company.
 - A spokesperson from the company was quoted saying: "Shortly after we opened the new showroom, we had a dramatic and wholly unanticipated jump in showroom orders. We can attribute this jump totally to the new lighting and the environment which it has created for us."

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Case Studies—Impact of Lighting

- Colonial Park Plaza (Shopping Center) case study conducted by the National Lighting Bureau.
 - They retrofitted their existing indoor lighting system to improve current retail environment.
 - In this case, it cost them \$51,000 to install the new lighting system.
 - The change was very beneficial to the owner of the center as well as the retailers using the space within.
 - The owner of the center reduced his maintenance and operating costs by 55% saving about \$8,500 every year (ROI within 6 years).
 - The retailers benefited in that the new lighting system created a brighter, cheerier, shopper friendly environment which caused more people to visit the center and subsequently caused a revenue increase of nearly 1 million dollars to the retailers.
 - The investment began to pay dividends very quickly due to the extensive impact on reduced energy costs and increased sales.



<http://www.flickrriver.com/photos/33445721@N04/14965342131/>

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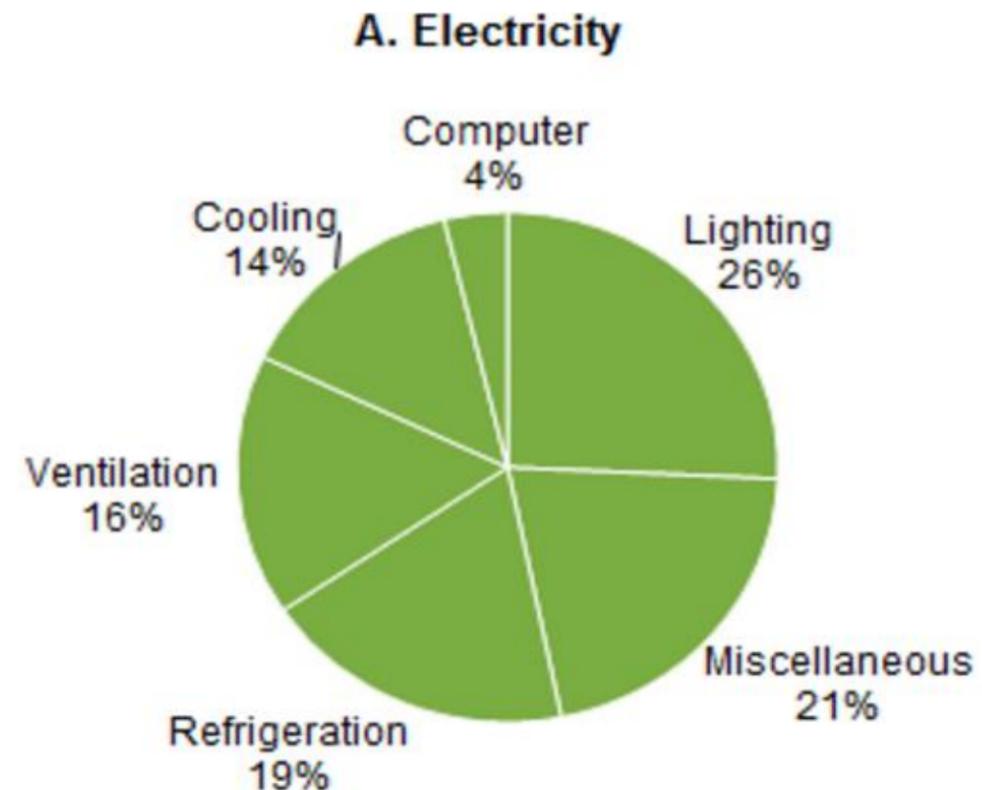
Case Studies—Impact of Lighting

- Convenience Store/Gas Stations case study conducted by Osram Sylvania.
 - Retrofitted previous lighting system with more efficient forms of lighting.
 - Replaced Halide lamps with more efficient linear fluorescent lamps at a 1:1 lamp ratio.
 - Benefits:
 - Reduced energy cost and usage.
 - Increased the amount of light emitted from the fixtures from 226 lux to around 430 lux.
 - Fewer accidents due to better visibility.
 - Lighting retrofit created an attractive and safe environment for customers which subsequently caused an increase in sales.



Electricity Consumption

Figure 1: Energy consumption by end use

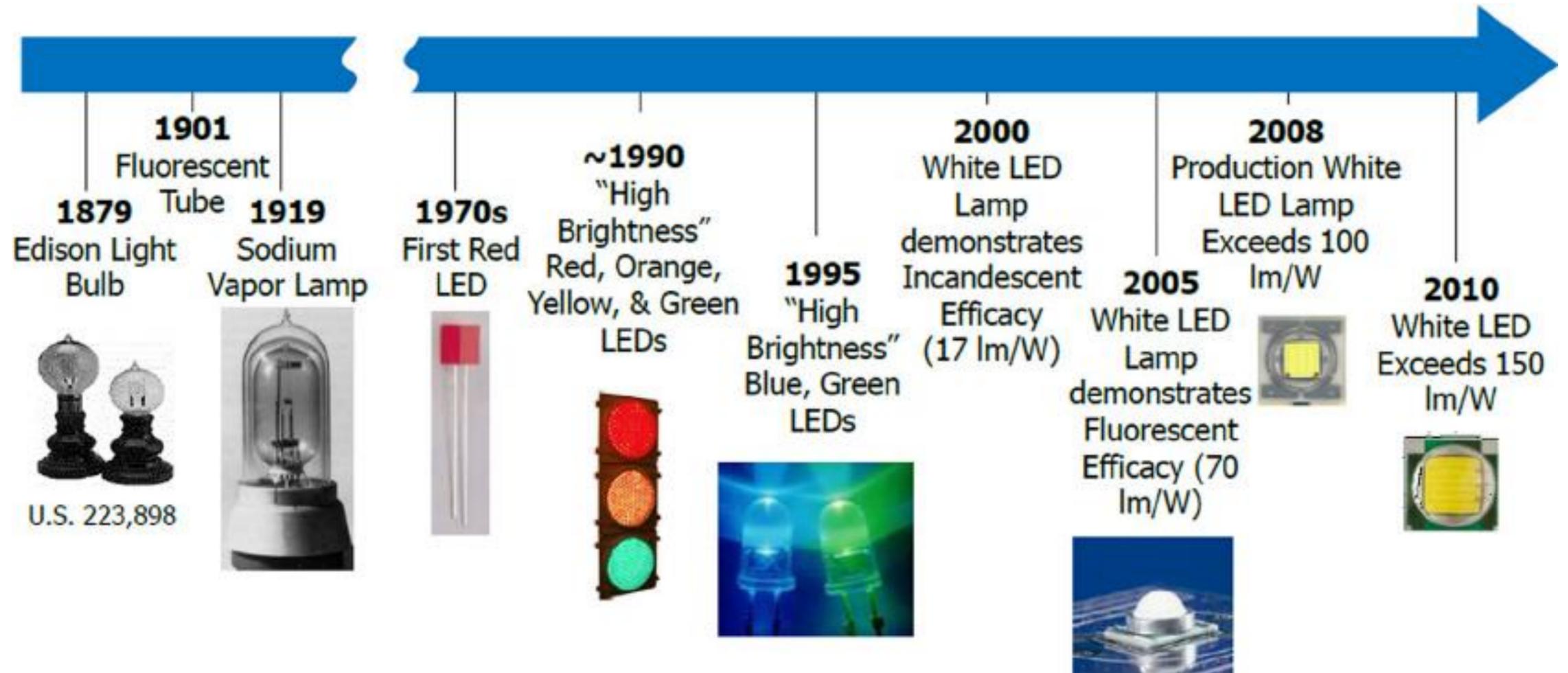


Notes: Heating, office, cooking, and water heating end uses each represent less than 5 percent of total consumption and are included in "Miscellaneous" uses.

<https://nrg.bizenergyadvisor.com/retail-buildings>

- Lighting is a very large portion of the electricity consumption in retail stores.
- Improving lighting efficiency can have a sizeable impact on the bottom line.

History of LEDs

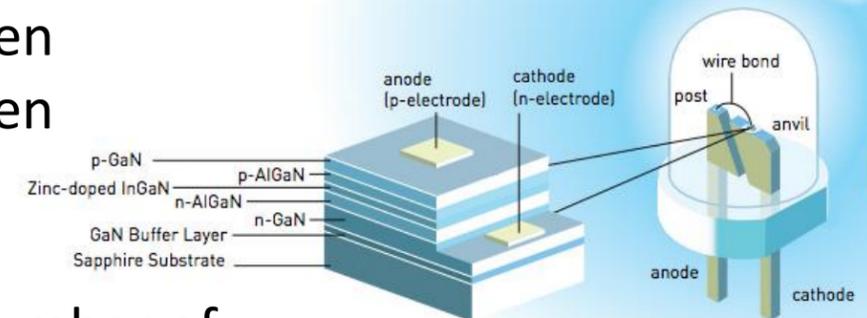
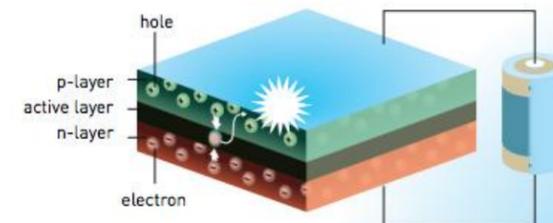


https://www.researchgate.net/figure/260998008_fig5_Fig-5-Brief-history-of-lighting-highlighting-some-milestones-in-LED-development

- The field of lighting has been revolutionized by the advent of LEDs.

History of LEDs

- The Field of lighting has been revolutionized by the advent of high-brightness blue LED.
- Invented by Shuji Nakamura.
- He won the 2014 Noble Prize in Physics for the creation of efficient blue LED and the way he effectively changed the worlds look on lighting and the energy saved by his creation.
- He was able to achieve bright blue light by utilizing gallium nitride wafer on a sapphire substrate.
- The creation of the royal blue LED diode by Shuji Nakamura made it possible to have an efficient white light source.
- Lightly coating the Blue LED with phosphorous allows for white light to be produced.
- These LEDs convert electricity much more efficiently then other forms of lighting:
 - Nearly 80% of the electricity is converted to light compared to incandescent lights which only convert 20%.
 - The remaining percentage of electricity is given off as heat in the production of light which then adds to operating cost by the increased air conditioning etc.
- A Highly efficient source of white light has a large number of applications.



<https://gigaom.com/2014/10/07/a-nobel-prize-goes-to-the-inventors-of-blue-leds-including-a-startup-founder/>

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Illustration: © Johan Arnestad/The Royal Swedish Academy of Sciences

- Eco Friendly
- Efficient
- Decreased Electricity Cost
- Long Lasting
- Low Maintenance

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Benefits of LED Lighting

60 watt Incandescent	14 watt CFL	12 watt LED
		
	\$58 Lifetime Savings over an incandescent with the same brightness	\$200 Lifetime Savings over an incandescent with the same brightness
Yearly Operating Cost - \$12.92	Yearly Operating Cost - \$3.01	Yearly Operating Cost - \$2.58
Energy Usage - 60w	Energy Usage - 14w	Energy Usage - 12w
Brightness(Lumens) - 800	Brightness(Lumens) - 800	Brightness(Lumens) - 800
Bulb Lifetime- 750 Hours	Bulb Lifetime - 10,000 Hours	Bulb Lifetime- 50,000 Hours+
		

<https://www.energyearth.com/general/categories/lighting/learn-more>

- Comparison of Incandescent, compact Fluorescent and LED light bulb.

Benefits of LED Lighting

- Sample Return On Investment from an ambient lighting retrofit.
 - Replacing Fluorescent tube light with LED tube light.
 - Customized Return on investment can be prepared upon request.



Sample ROI

3' Fascia Cornice Light

T8 Fluorescent Version vs. Plug and Play LED Tube Replacement version

Evaluation based on estimate single store count. (Accurate count and ROI can be provided upon request)

	T8 Fluorescent Version		LED Proposal		
	Qty	Wattage Each	Qty	Wattage Each	
Per Store	94	25.0	94	10.0	
<i>Initial Bulb Cost</i>	\$0.00		\$7.00		*NOTE: Initial Fixture Cost estimated. Dependent on quantities ordered; Cost of replacement fluorescent bulb based on average bulb cost
<i>Cost Of Replacement Light Bulb</i>	\$2.10		n/a		
<i>Life Expectancy of Fixture/bulb (h)</i>	20000		50000		
<i>Usage/day</i>	14.25		14.25		
<i>Life Expectancy in years</i>	3.8		9.6		
<i>Time Needed to Install Fixture (minutes)</i>	0.0		5.0		
<i>Time Needed to Replace 3ft Light Bulbs (minutes)</i>	5.0		0.0		
<i>Labor Rate to Install Fixtures (/hour) - store associate</i>	\$0.00		\$12.75		
<i>Labor Rate to Install Bulbs (/hour) - store associate</i>	\$12.75		\$0.00		
<i>Labor Cost to Install Bulb</i>	\$0.00		\$1.06		
<i>Labor Cost to Replace Light Bulb</i>	\$1.06		\$0.00		
<i>Cost of Electricity \$/ kW h</i>	\$0.11		\$0.11		
Total Electricity cost/ yr	\$1,345		\$538		
Annualized Maintenance Cost/ yr	\$154.62		n/a		

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Benefits of LED Lighting

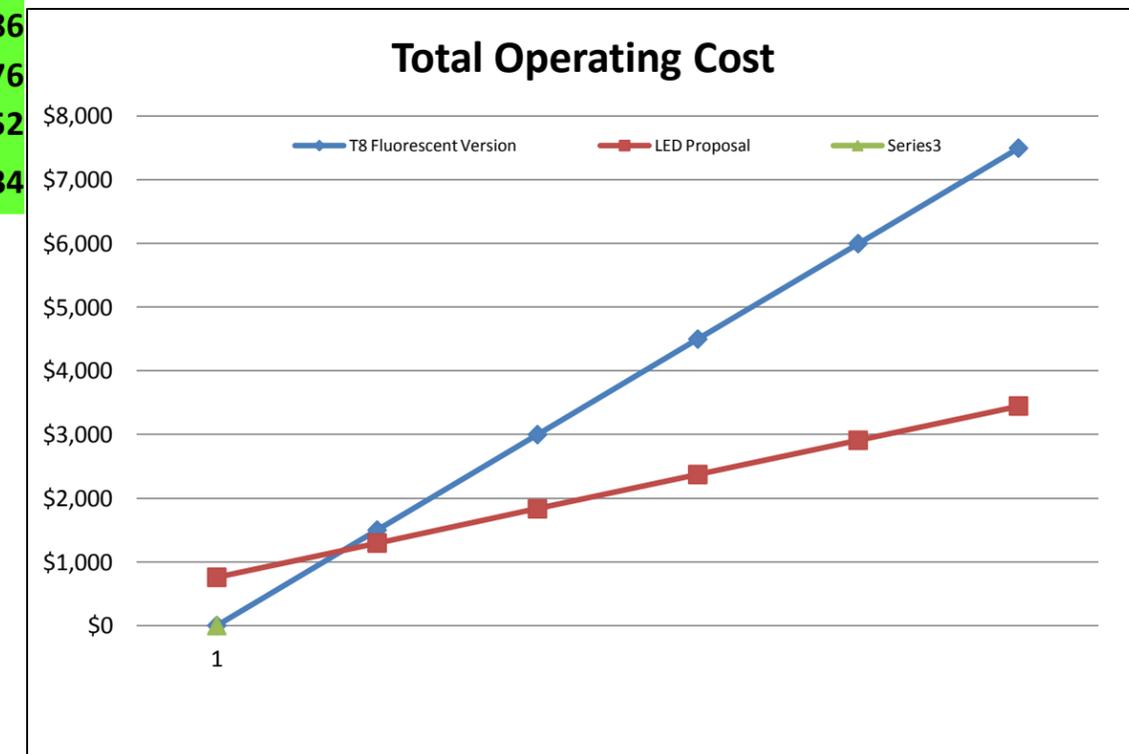
- The large savings in operating cost provided by LEDs will help recoup the initial investment at an accelerated rate.

Total Operating Cost

	T8 Fluorescent Version	LED Proposal	Savings
<i>Initial Cost of Fixtures (Installation)</i>	\$0	\$758	-\$758
<i>Year 1: Total Cost of Fixtures + Electricity</i>	\$1,499	\$1,296	\$203
<i>Year 2: Total Cost of Fixtures + Electricity</i>	\$2,998	\$1,833	\$1,165
<i>Year 3: Total Cost of Fixtures + Electricity</i>	\$4,497	\$2,371	\$2,126
<i>Year 4: Total Cost of Fixtures + Electricity</i>	\$5,997	\$2,909	\$3,087
<i>Year 5: Total Cost of Fixtures + Electricity</i>	\$7,496	\$3,447	\$4,049

Total Energy Savings Per Store Over 5-Years:

	T8 Fluorescent Version	LED Proposal	Savings
1 Store Total :	\$7,495.72	\$3,446.92	\$4,048.80
30 Store Total :	\$224,871.49	\$103,407.64	\$121,463.86
50 Store Total :	\$374,785.82	\$172,346.06	\$202,439.76
100 Store Total :	\$749,571.64	\$344,692.13	\$404,879.52
2000 Store Total :	\$14,991,432.84	\$6,893,842.50	\$8,097,590.34



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Environmental Benefits

- Electricity production accounts for a substantial portion of the CO₂ emissions.
- Utilizing a more efficient lighting source (such as LEDs) will cut down on the need and use of electricity there by reducing the total amount of carbon dioxide released into the air.

Carbon Dioxide Emissions

Emissions Rate (lbs of CO₂/kWh): 1.250

	T8 Fluorescent Version	LED Proposal
Emission of CO ₂ (pounds per store)	15,279	6,111
Emission of CO ₂ (pounds Total)	763,934	305,573

Reduction Amount of CO₂ per store, per year, using LED Solution vs. T8 Fluorescent Solution

- 1 Store Overall CO₂ Reduction:**
- 30 Store Overall CO₂ Reduction:**
- 50 Store Overall CO₂ Reduction:**
- 100 Store Overall CO₂ Reduction:**

9,167.20	lbs.
9,167.20	lbs.
275,016.09	lbs.
458,360.16	lbs.
916,720.31	lbs.

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Case Studies—LED Lighting

- Study Conducted by Cree Lighting
- New Burger King Construction
 - Made the decision to utilize LED lighting rather than metal halide fixtures.
 - Utilized LEDs in both interior and exterior lighting needs.
 - The new lighting solution provided a consistent and uniform light which contributed to creating a welcoming and safe environment.
 - The newly implemented lighting solutions were able to reduce the energy consumptions of the restaurant by 74%.
 - Leading to savings of \$3500 per year.
 - The restaurant owner was able to see a full return on investment in just two years time and is able to continue operating at a lower cost in the future.



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Case Studies—LED Lighting

- Study Conducted by Acuity Brands
 - Grocery store in California
 - Renovation of current store to implement energy saving measures in an attempt to reduce energy usage by 50%.
 - Full redesign of the current lighting system by installing new LED lighting products such as LED fixtures for ambient lighting as well as luminaires for task and accent lighting.
 - Results
 - Reduced their energy consumption by square foot basis from previous lighting by over 65%.
 - New lighting helped improve the appearance of products.
 - It also improved the retail environment for both employees as well as consumers making the store a better place to work as well as shop.



Case Studies—LED Lighting

- Specialty Store conducted by Osram Sylvania
- Aspen Skiing Company
 - Upgraded lighting by utilizing energy efficient lighting solutions such as energy efficient fluorescent and LED lamps in two of their stores.
 - Lighting upgrades saved over 37% in energy usage which led to a decrease in operating cost while provided 3x more ambient light.
 - Implementation of fluorescent and LED lamps decreased the maintenance cost due to their long lives of 12,000hrs & 25,000hrs, respectively.
 - The LED lamps provided a Color Rendering Index of 87 which made the products more appealing allowing the colors to be more pronounced/look natural .
 - The improved lighting led to an increase in sales of 10%.



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How Can We Help You?

Trinity Manufacturing, LLC.

- Products

- Vast selection of current products that are efficient and innovative.
- Engineer customized products to suit client needs.
- Value engineer existing products and projects to reduce cost for our customers.

- Service

- Detailed and thorough client communication to ensure client is well informed on the status of their projects and inquiries.
- Thorough detailed Instruction sheets provided to ensure smooth and easy installation.
- All fixtures and displays are covered by a 5 year warranty.
- Malfunctioning units covered under warranty.
- Units out of warranty will be serviced in a timely manner but will be charged a reasonable cost.

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