5th Annual

A Better City

Challenge for Sustainability

Business and Institutional Leaders Working Toward a Sustainable City

Kick Off

JANUARY 7, 2014

Funded by:

BARR FOUNDATION

The Boston Foundation

2013 Challenge for Sustainability

Agenda

8-8:30 -- Breakfast

8:30-8:35 -- Welcome - Rick Dimino, President &CEO, ABC

8:35-8:50 -- Brian Swett - Chief of Environment & Energy, City of Boston

8:50-9:00 -- Mariella Puerto - Senior Program Officer, Barr Foundation

9:05-9:25 -- Introduction of team & walk through of new scorecard

9:30-10:00 -- Jennifer Dolin,
Manager of Sustainability & Environmental Affairs, Sylvania

2013 Challenge for Sustainability

Goals

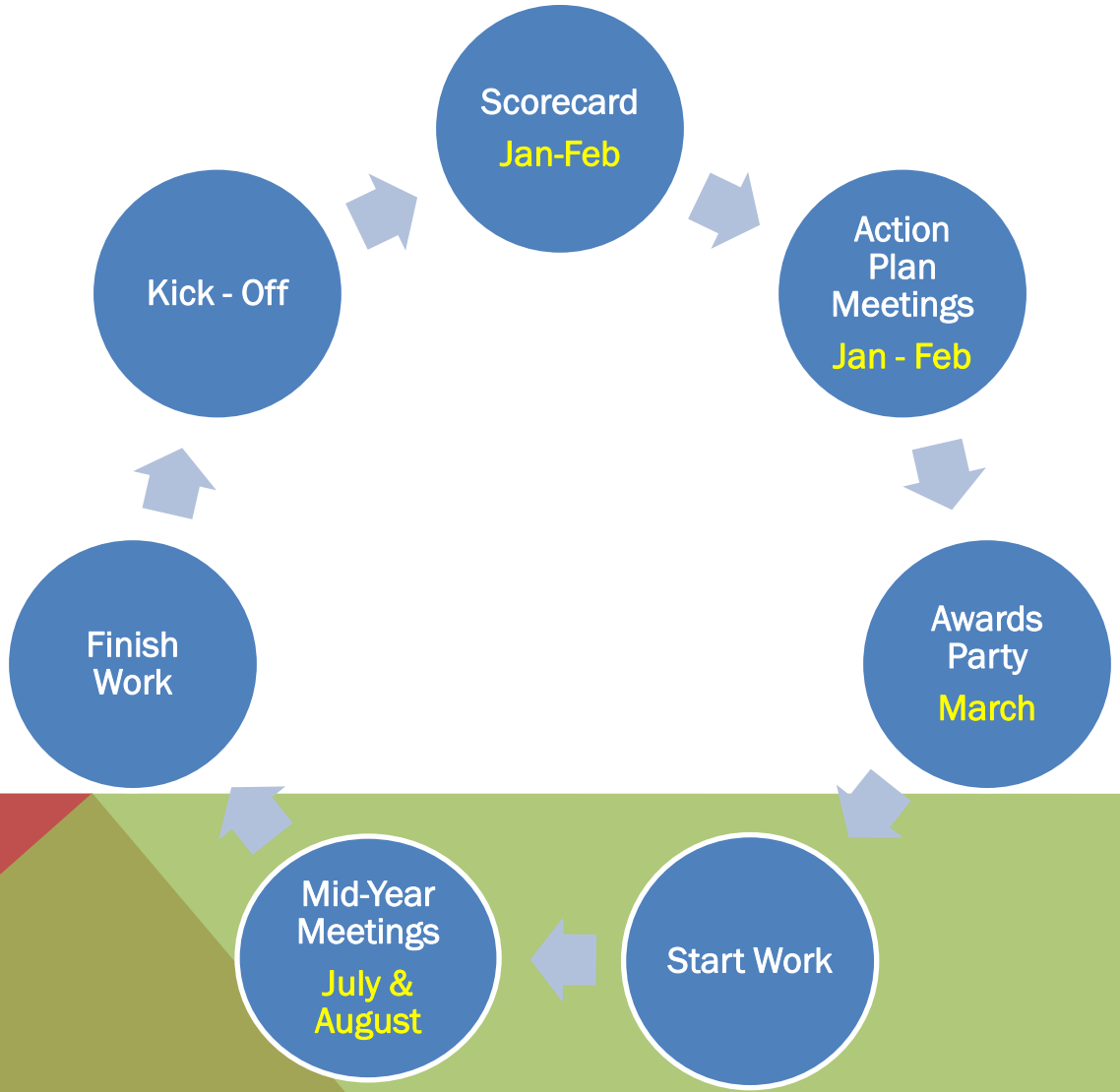
1. **2.5% GHG Reduction per year**
2. **Reduce resource consumption**
3. **Reduce Costs**
4. **Share successes and barriers**

CHALLENGE PARTICIPANTS

	2010	2011	2012	2013	2014
Properties	18	37	73	97	105
Square Feet	5 million	15 million	22 million	27 million	30 + million
Employees	28,446	47,289	62,474	71,000	
kWh	103 million	284 million	359 million	569 million	

2013 Challenge for Sustainability

Process



CHANGES TO REFLECT NEW ROLE

- Benchmarking through direct utility downloads
- BERDO reporting – direct download/upload with Portfolio Manager
- Revising scores to tie to GHG reductions
- Improve and migrate Challenge and tools to stand alone web site


Scorecard
GHG Reduction
New Score

SCORECARD IN POINTS

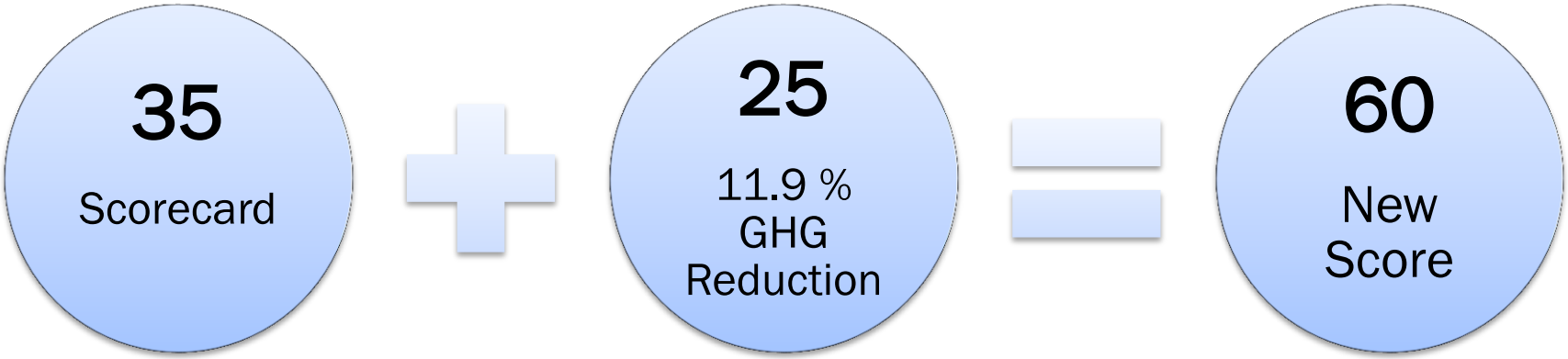
Scorecard Score	Points
0-19	5
20-29	10
30-39	15
40-49	20
50-59	25
60-69	30
70-79	35
80-89	40
90-99	45
100+	50

GHG REDUCTION SCORE

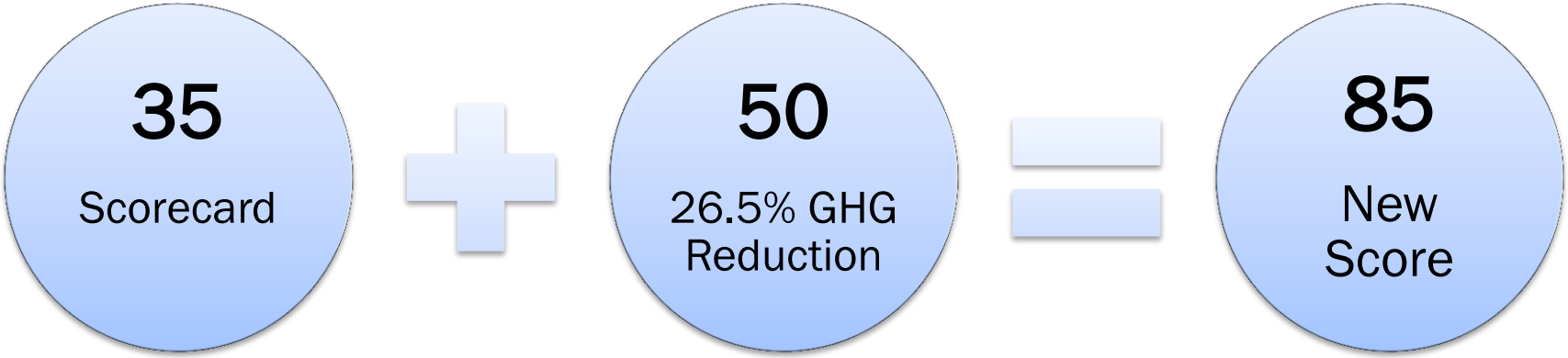
GHG Reduction	Points
0-1.9%	5
2.0-3.9%	10
4.0-5.9%	15
6.0-8.5%	20
8.6-10.9%	25
11.0-13.9%	30
14.0-17.0%	35
17.1-20.5%	40
20.6-24.9%	45
25%+	50

OLD SCORE VERSUS NEW SCORE

PARTICIPANT A: 2012
SCORE 61



PARTICIPANT B: 2012
SCORE 73



OLD SCORE VERSUS NEW SCORE

Old Score	Scorecard Points	GHG Reduction over 2 y ears	GHG Points	New Score
61	30	-3.8%	10	40
73	35	-26.5%	50	85
70	35	-11.3%	25	60
65	30	-8.7%	20	50
56	25	-10.2%	25	50
81	40	-7.8%	20	60
64	30	-13.2%	30	60
59	25	-.3%	5	30
74	35	-11.7%	30	65
54	35	+ 25%	0	35

Sustainable Lighting Solutions

Jennifer Dolin, LEED AP, LC
Manager of Sustainability and Environmental Affairs

OSRAM SYLVANIA

OSRAM SYLVANIA Products

Consumer Lighting

Specialty Lighting

Professional Lighting

- Fluorescent lamps
- Lighting management systems
- HID
- LED) modules and drivers

Opto Semiconductors

- LED and Organic LED
- High-power laser diodes
- Infrared components

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OSRAM SYLVANIA:
Did You Know?

OSRAM SYLVANIA LEDs illuminate the National Mall in Washington D.C.

Motion-sensing OSRAM SYLVANIA LEDs light the Apple iPhone®

Over 2/3 of all SYLVANIA products are manufactured in the USA

OSRAM SYLVANIA received 2 OSCAR® Awards and one Emmy® award for film lighting

OSRAM SYLVANIA Leads Sustainability in Lighting

Global Care represents OSRAM SYLVANIA's commitment to environmental and social responsibility.

Sustainability leader, focusing on reducing environmental impact of products and processes for our company and for our customers

www.sylvania.com/sustainability

Products	Processes
Longer life lamps	**All NAFTA facilities ISO 14001 certified**
Reduced hazardous materials **• Mercury reduction of up to 92%** **• Lead-free glass**	**Packaging improvements to reduce materials usage, improve transportation efficiency**
Greater lighting system efficiency	**Fleet policies to reduce idling, speed, emissions**
LEED assistance for customers **• Products help achieve LEED points** **• LEED mercury calculation assistance**	**Ongoing plant improvements in energy and waste reductions, increased recycling, and elimination of hazardous materials**
Investment in new technologies (LED) that address environmental impacts	**Lamp recycling included in SLS services = 6% of all lamps recycled in US, avoiding 115 pounds of mercury from landfills**

Recognized for our achievements:

10-year ENERGY STAR Partner of the Year

Clean Fleets Award

US DOE Workplace Charging Challenge Partner

20% absolute corporate greenhouse gas emissions reduction in 5 years (exceeded goal set by +100%)

Member of USGBC since 2003

Member of EPA SmartWay Transport Partnership since 2008

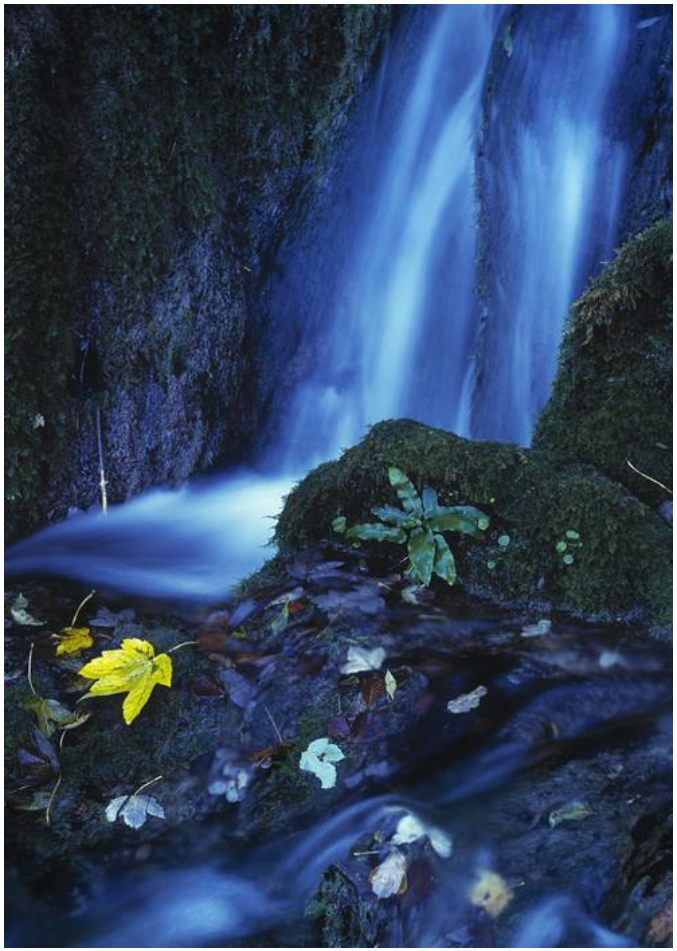
12.5% product energy intensity reduction in 5 years

Platinum Sponsor of Green Parking Council since 2012

What is a “Sustainable Lighting Solution?”

High Performance Lighting that addresses:

- Decreased overall environmental impact
- Significant reduction in operating costs
- Safety and security in all parts of an operation
- Reduced carbon footprint
- Responsible disposal at end of life



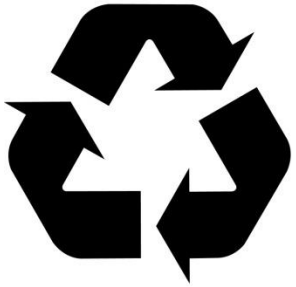
Key Environmental Factors and Benefits

Longer Lamp Life	• Fewer lamps purchased • Lower maintenance costs • Reduced raw material • Fewer lamps to dispose of at end of life
Reduced Use of Hazardous Materials	• Comply with European RoHS* directive • Comply with TCLP and Universal Waste • Reduced environmental impact
Higher Efficacy	• Fewer lamps used • Fewer CO2 emissions from power plants • Operating costs reduced
Lighting Controls	• Reduced energy consumption and power plant emissions
Proper Disposal (Recycling)	• Keeps mercury from being released to the environment

* RoHS: Restriction of Hazardous Substances

Other environmental factors to consider

Use of Recycled Materials



- Pre-consumer materials
- Post-consumer materials
- Glass, metals, mercury
- Packaging

Transportation

- Cube efficiency
- Routing efficiency
- Speed management and no-idling policies
- Location of manufacturing and distribution centers

Made in the USA

Major Focus on Energy Usage

Energy efficiency means you…

- Don’t waste energy
- Don’t waste money
- Don’t waste light

And it goes beyond just lower wattage lamps.

- Energy-efficient lighting systems
- Lighting controls
- Daylight harvesting

How does energy-efficient lighting lower your carbon footprint?

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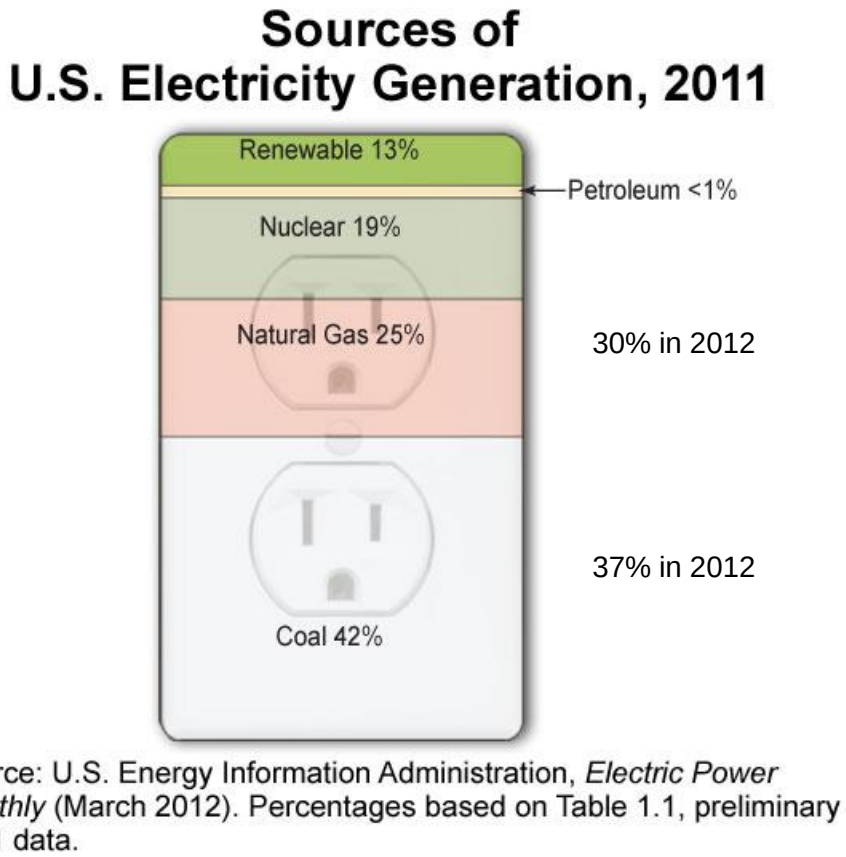
- Power plants burn fossil fuel to generate electricity
  - 68% from coal, gas and oil

- Eliminate ***wasted*** electricity usage to reduce carbon footprint

For example…

- Electricity for lighting accounts for ~95% of a parking structure annual energy cost

- Parking structures have high energy use based on long daily operating hours (IPI member survey 2010)
  - Continuously lit 18 hrs/day = 6,570 hrs/year
  - Occupied 20% of the time

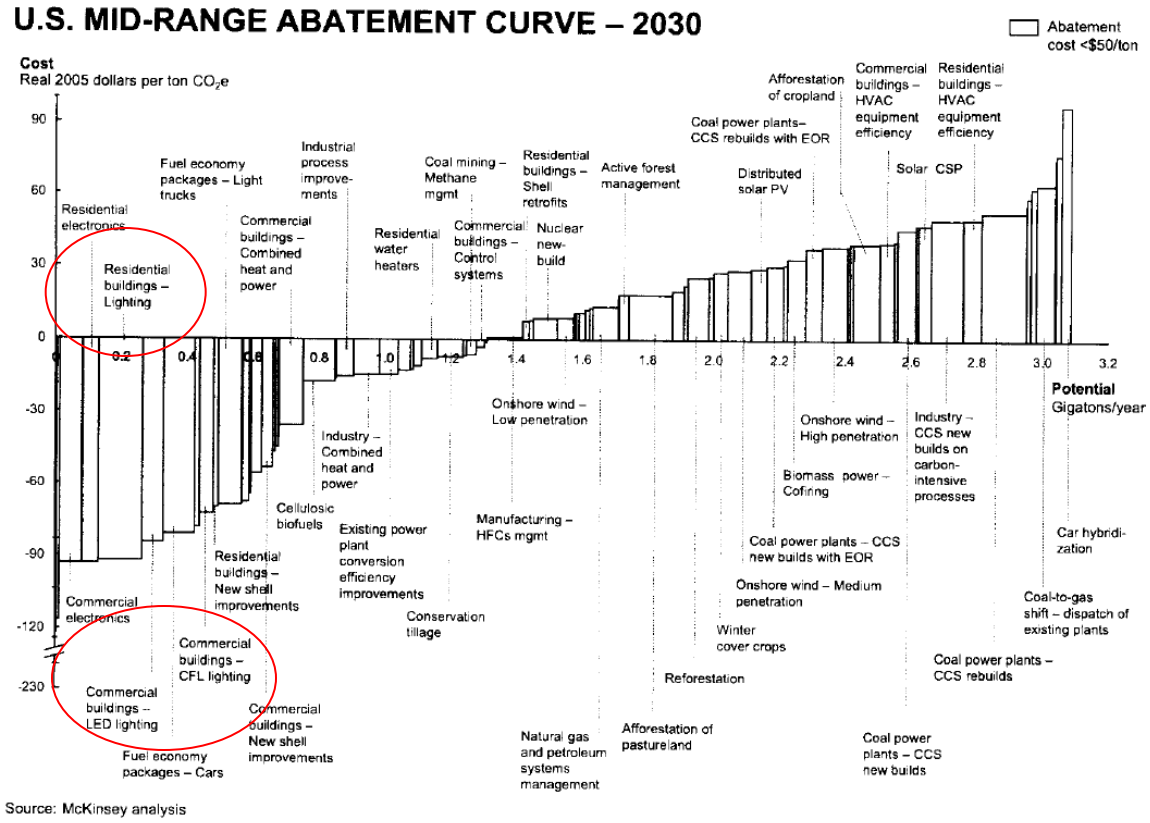


Source: U.S. Energy Information Administration, *Electric Power Monthly* (March 2012). Percentages based on Table 1.1, preliminary 2011 data.

Reducing Carbon Footprint

Improving lighting systems is one of the most cost-effective ways of reducing ghg emissions and lowering a carbon footprint

- "Low-hanging fruit" grows back
- Advanced technologies and lighting systems can reduce energy consumption significantly



Source: McKinsey analysis

Traditional Lighting Technologies

Traditional Lighting Technologies

Fluorescent systems

-- lamp, ballast and fixture

-- linear and compact

-- induction/electrode-less

Benefits

- Long lamp life
- Energy efficient
- Good lumen maintenance
- Instant on
- Dimmable (with appropriate ballast)

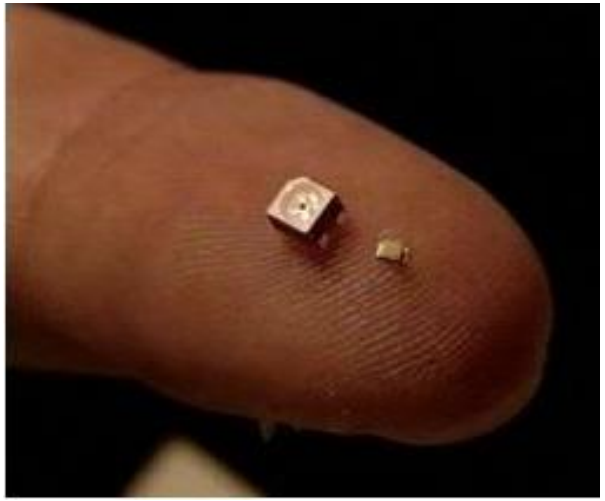
Traditional Lighting Technologies

HID (High Intensity Discharge)

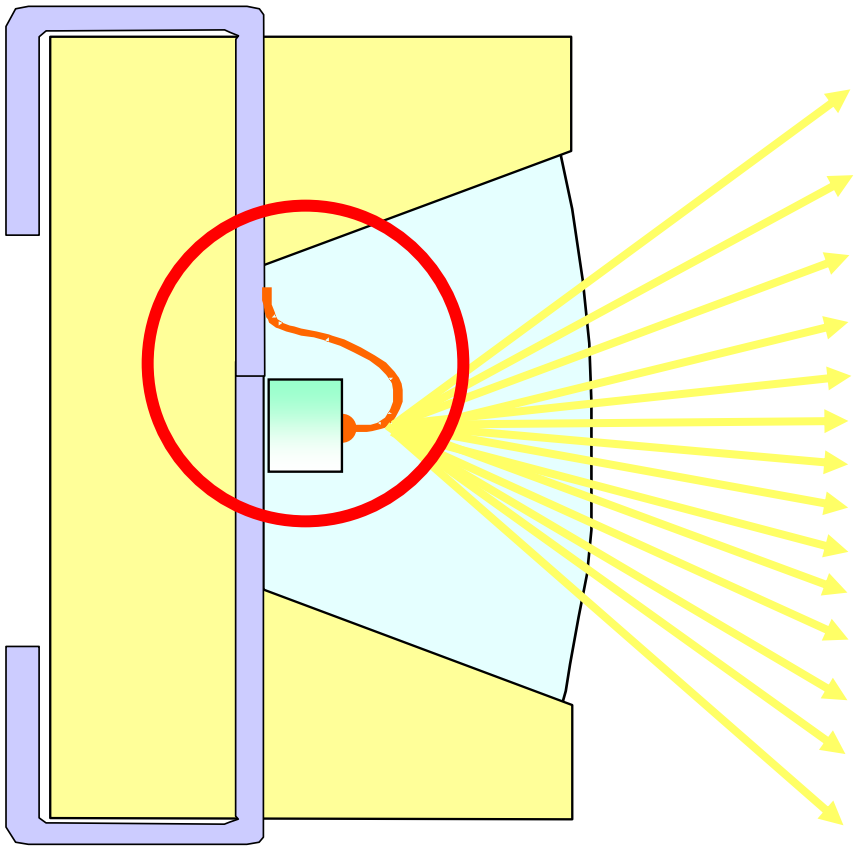
- High Pressure Sodium
- Low Pressure Sodium
- Metal Halide
- Ceramic Metal Halide

Typical applications	Benefits	Disadvantages
• Parking	Long life	Re-strike time
• High bay	Lumen maintenance	Expensive to dim
• Roadway	All-weather operation	Color
• Security		

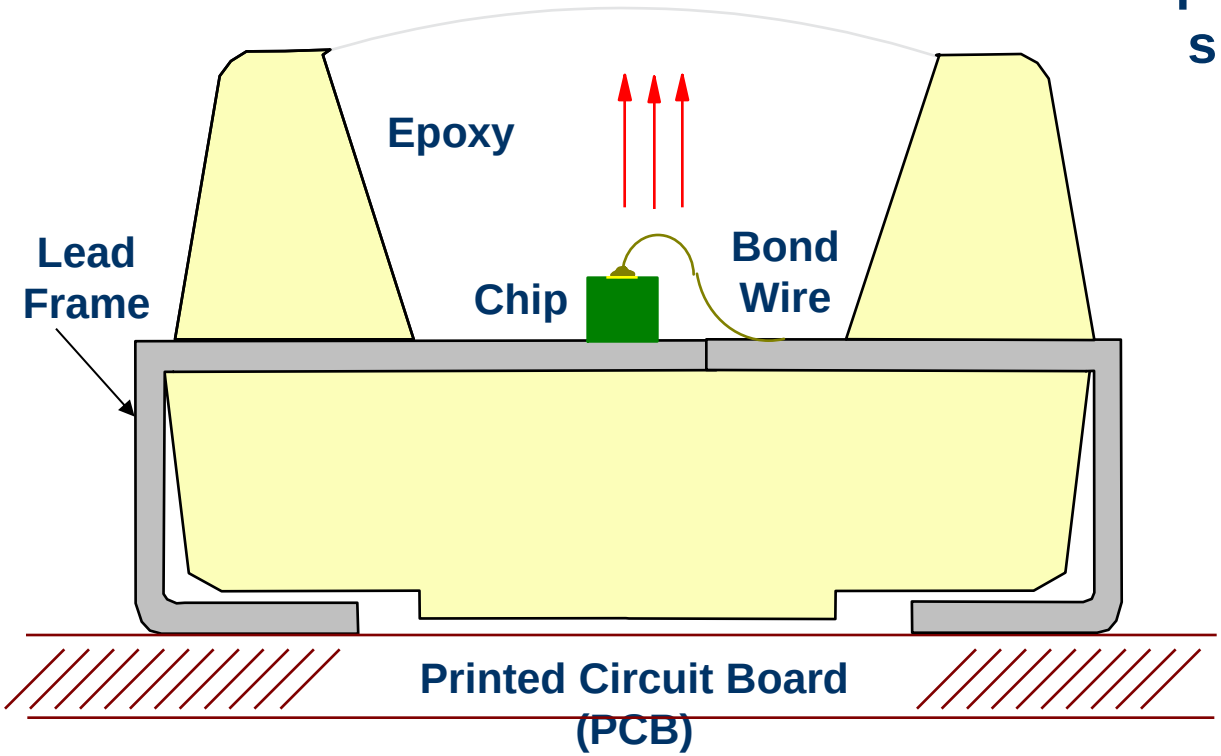
What is an LED: Light Emitting Diode



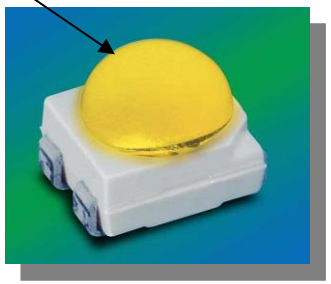
A light-emitting diode is a semiconductor device that emits narrow-spectrum light when electrically biased in the forward direction.



How LEDs Work – LED Package

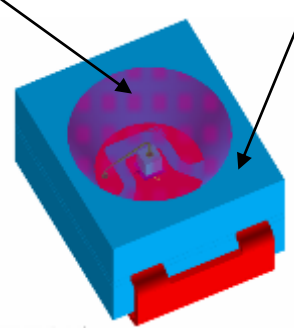


Optics



Reflector

Mold



Thermal Management – Radiation vs. Conduction

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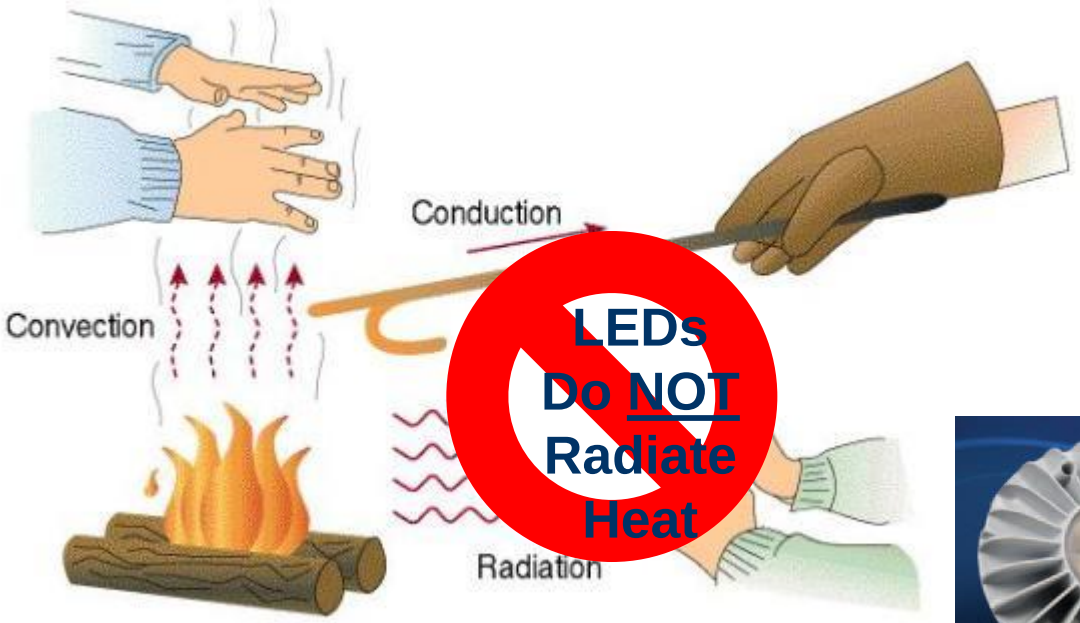
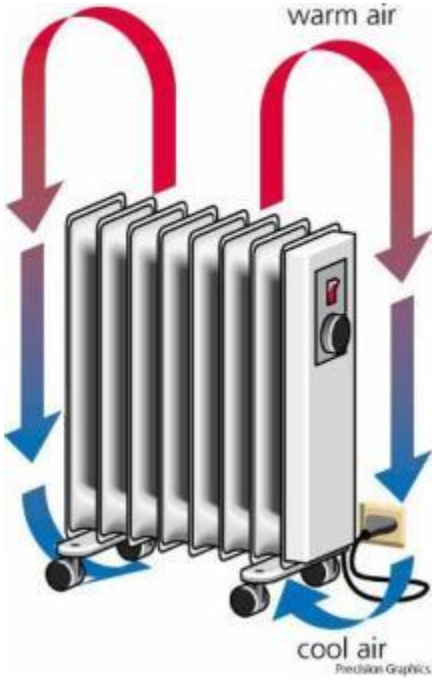
Thermal management is required for all LEDs.

It must be conducted away from the LEDs by a *heat sink*.





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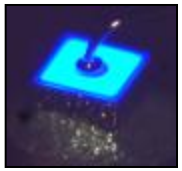
LED Terminology

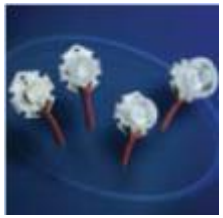
Chip and Package | Board | Heat Sink | Optics | Power and Control | Fixture

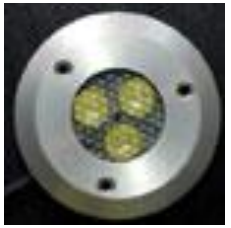










Benefits of LEDs

Long Lifetime

High Efficacy

High System Efficiency

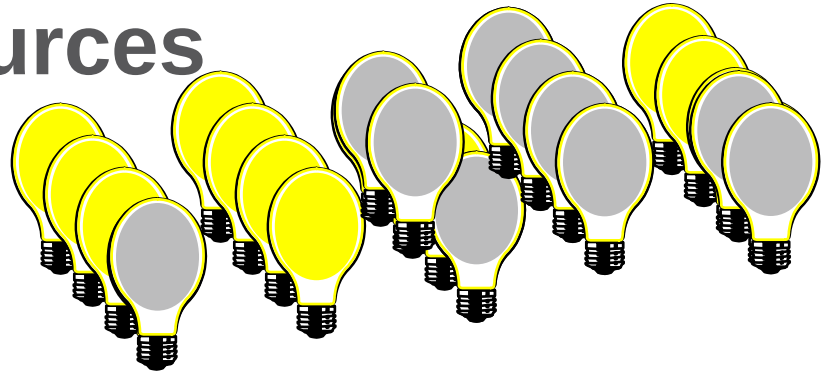
- Freedom of design due to size
- Dynamic color changing
- Controllability
- Mercury-free and lead-free
- No UV (ultraviolet) and no IR (infra red)

Lamp Life…Redefined

Average Rated Life

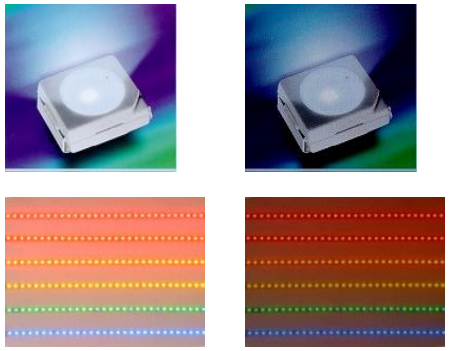
for traditional light sources

- The point at which 50% of a large group of lamps fail



Rated Life for LEDs

- The point at which the light output is 70% of its initial value



System Efficacy vs. LED Chip Efficacy

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LED system efficacy is always lower than LED chip efficacy

LPW	100	95	90.25	78.96	67.29

Technology Comparison – parking facility example

	LED	Linear Fluorescent	Induction Fluorescent	Metal Halide
Ratings Key Better ← → Worse				
Color Quality (CRI) + More accurate identification	◖	○	◗	◖
Life + Reduce maintenance cost	◖	◖	○	◯
Optical Control + Better uniformity at wider spacing	○	◗	●	◖
Low Glare + Increased visual comfort	●*	◖	○	◗
Controllability + More aggressive energy saving strategies	○	◖	◯	●
Energy Efficiency + Reduced operating cost Improved rebate eligibility	○	○	◗	◗
Initial Cost + Faster return on investment	◗	○	◗	◯
Ambient Conditions + Less sensitive to temperature extremes	◖	●	◯	○

* **Early issues since resolved**

OSRAM SYLVANIA

Lakeland HealthCare Parking Facility, St. Joseph, MI

- Four-level facility
- 231 metal halide fixtures with 175W lamps
- Power outages caused lamp and ballast failures, raising security concerns

LED solution:

- Immediately powered on after a power outage
- Reduced energy and maintenance savings by $52,316 annually
- Saved 326,299 kWh annually
- Avoided 635,435 pounds of CO_2 annually

Lamp Recycling – State disposal regulations

12 states in the US have mandatory landfill and incinerator bans for mercury-containing lamps

Mandatory landfill bans – commercial only
Connecticut
Florida
New York
Rhode Island
Tennessee

Mandatory landfill bans – commercial and household
California
Maine
Massachusetts
Minnesota
New Hampshire
Vermont
Washington state

Requires hazardous waste disposal or recycling for mercury-containing lamps

Lighting Controls are now Code

Expect controls to become required in all applications. Appropriate fixtures should be considered.

ASHRAE 90.1-2010

- States required to adopt by October, 2013
- Occupancy sensors to dim or switch luminaires for a power reduction of at least 30%
- Retrofits are no longer exempt
- Many other requirements

IECC 2009

- Occupancy controls to dim or switch luminaires

Questions?

www.sylvania.com/sustainability

Jennifer Dolin, LC, LEED AP®
Manager of Sustainability and Environmental Affairs
978-750-2354
jennifer.dolin@sylvania.com

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Many Thanks.