

PHILIPS

Street lighting applications



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LUMILEDS
LIGHT FROM SILICON VALLEY

Why Street Lighting

- Size of market
 - Estimated 435 million “outdoor” lamps installed world-wide.
 - Valued at €6.2 billion (lamp+ballast+luminaire)
 - Estimated 15-20 million “**Street Lamps**” in the U.S. and 60+ million WW.
 - Translation: **Billions** of LEDs.
- Accessibility
 - Chunks of the market are directly accessible via Municipalities.
 - Retrofit customers are engaging with multiple U.S. cities via cold-calling.
 - Major Luminaire manufacturers have established relationships.
- Customer Incentive to Value Proposition
 - Municipalities have strong incentives to reduce power consumption and maintenance
 - Rising energy costs
 - Pressure to “go green” and eliminate hazardous waste.
 - Limited city budgets with strong competition for funds. Projects that combine a positive political message with “pay-back” receive attention.

Various types of outdoor/street lighting

Roadway / Street



Sidewalks



Parks

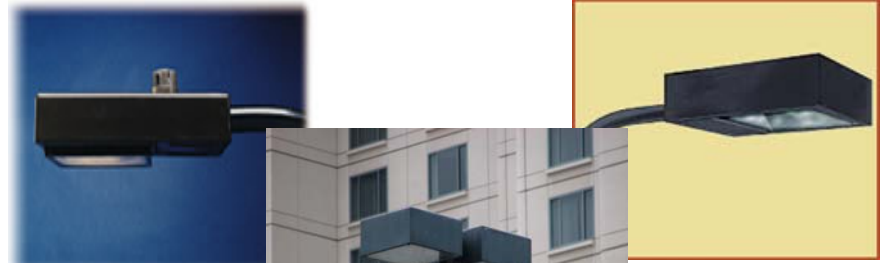


Various types of street luminaires

COBRA



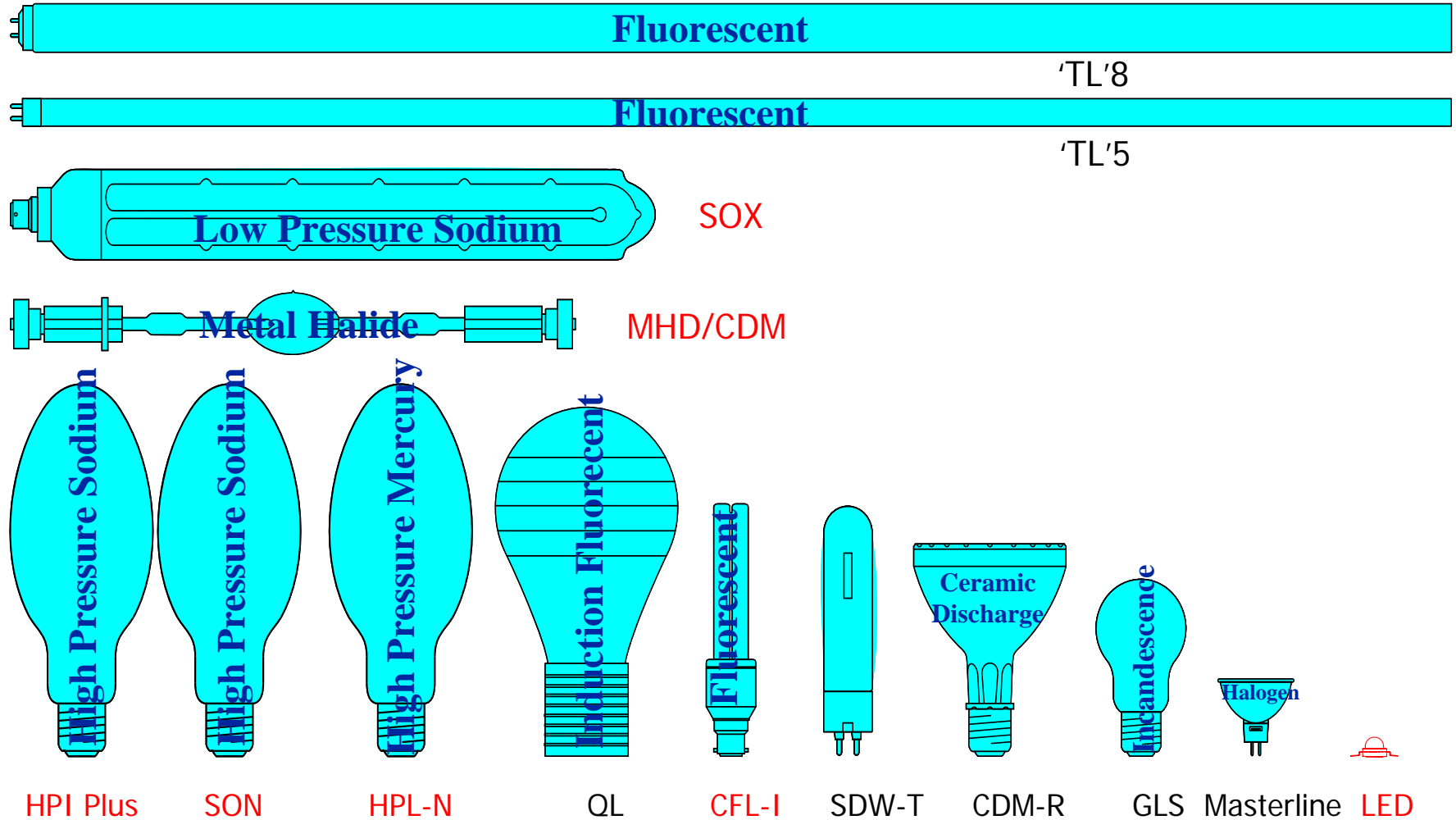
SHOE BOX/CAN



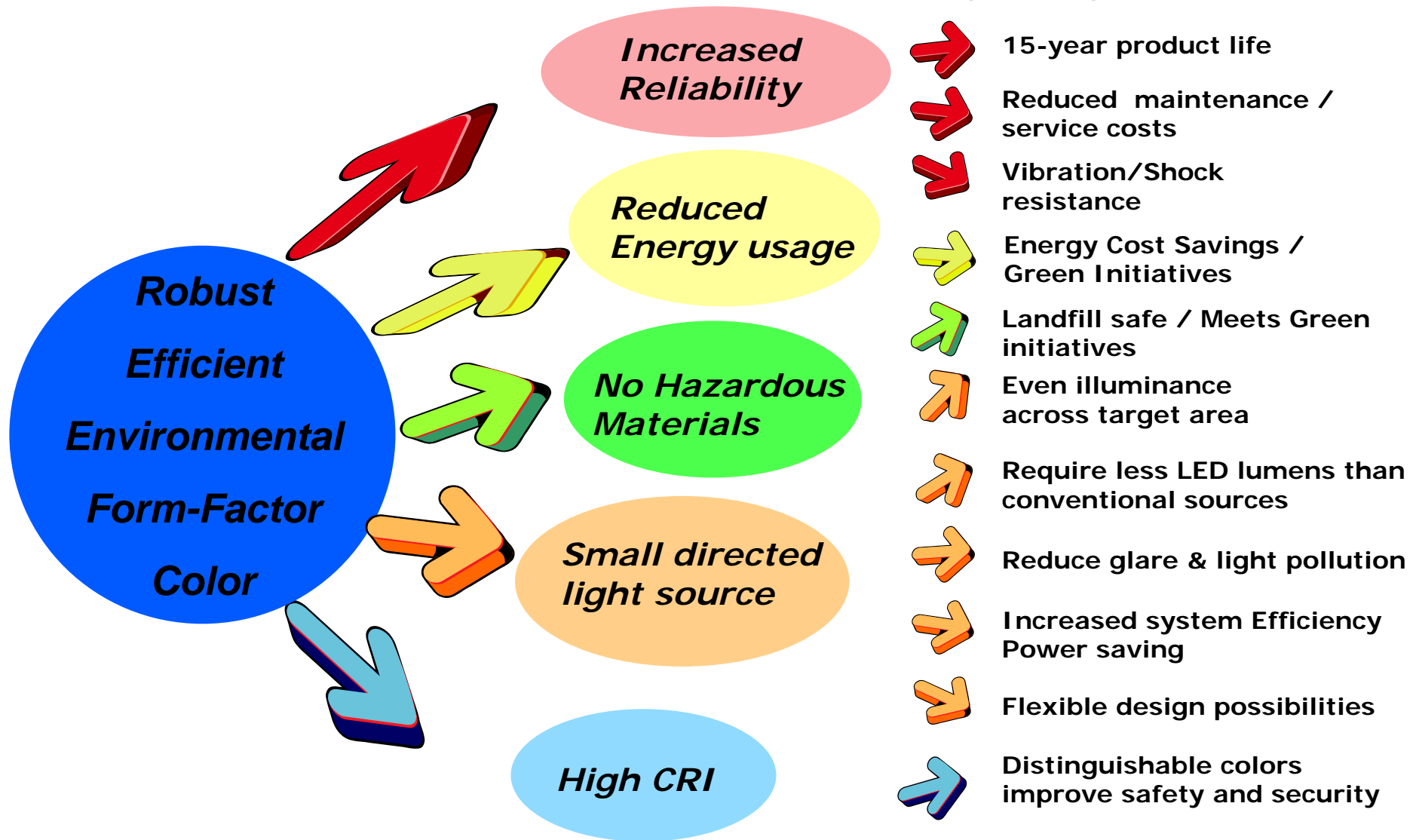
POLE/POST MOUNTED



Traditional lamps



LED Value propositions for Street Lighting



Street lighting classes

Luminance level and Luminance uniformity

Classes

- Traffic routes for motorized vehicles ($v > 40\text{km/h}$)
 - High traffic- and pedestrian density routes,
 - Residential, car parks etc
 - Vertical road layouts, like interchanges, roundabouts with road markings and elevations
- classes ME and MEW
class CE
classes S and A/ ES
class EV

CE Series of lighting classes

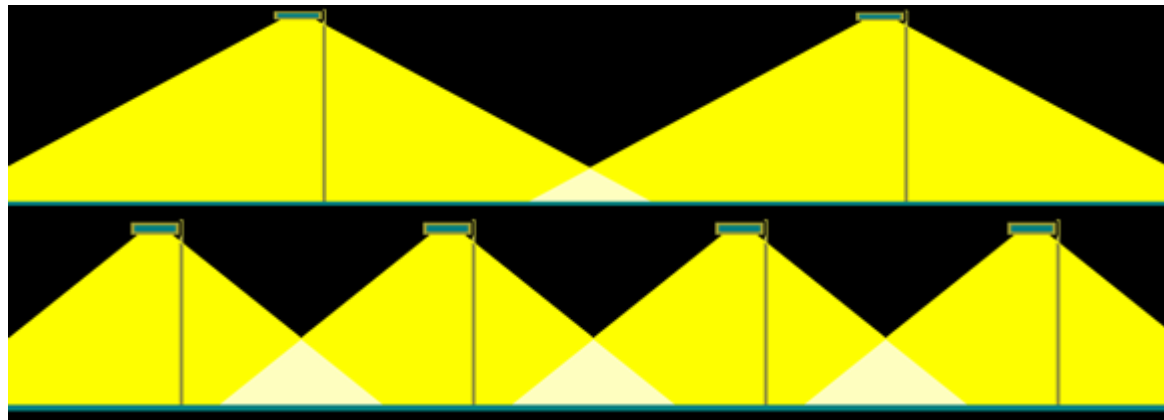
Class	Horizontal Illuminance	
	E in Lux (min.maintained)	U ₀ (Minimum)
CE0	50	0.4
CE1	30	0.4
CE2	20	0.4
CE3	15	0.4
CE4	10	0.4
CE5	7.5	0.4

Street lighting specifications

- Pole height / spacing
- Light requirement
 - Luminance level
 - Luminance area
 - Luminance uniformity
- Useful Light vs. Light Pollution
- Color
- Styling
- Other Features (dimming, control systems, etc.)

Pole Heights and Pole Spacing

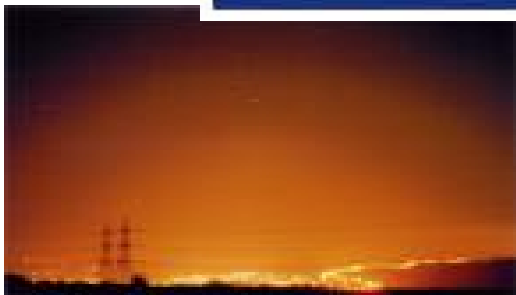
- Pole heights range from 4m to over 18m
- Pole heights vary per location
 - higher pole ("cobra head" type) --- main roadways and parking lots (8-18m)
 - shorter pole heights --- residential, parks and architectural or decorative luminaires (2.5-6m)
- Pole heights impact the homogeneity of light levels in the street and surrounding areas
- The higher and wider, the more LEDs required



Large spacing

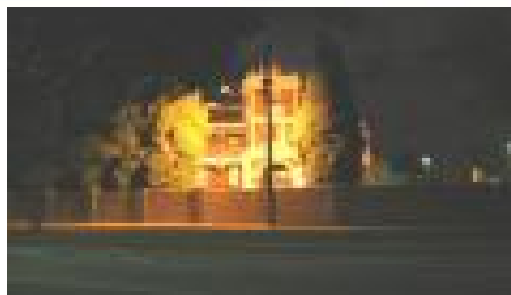
Small spacing

Types of Light Pollution



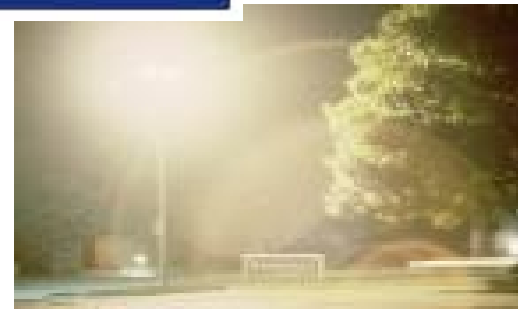
Sky glow

Refers to the "glow" effect that can be seen in the sky over populated areas.



Light Trespass

Occurs when unwanted light enters one's property.

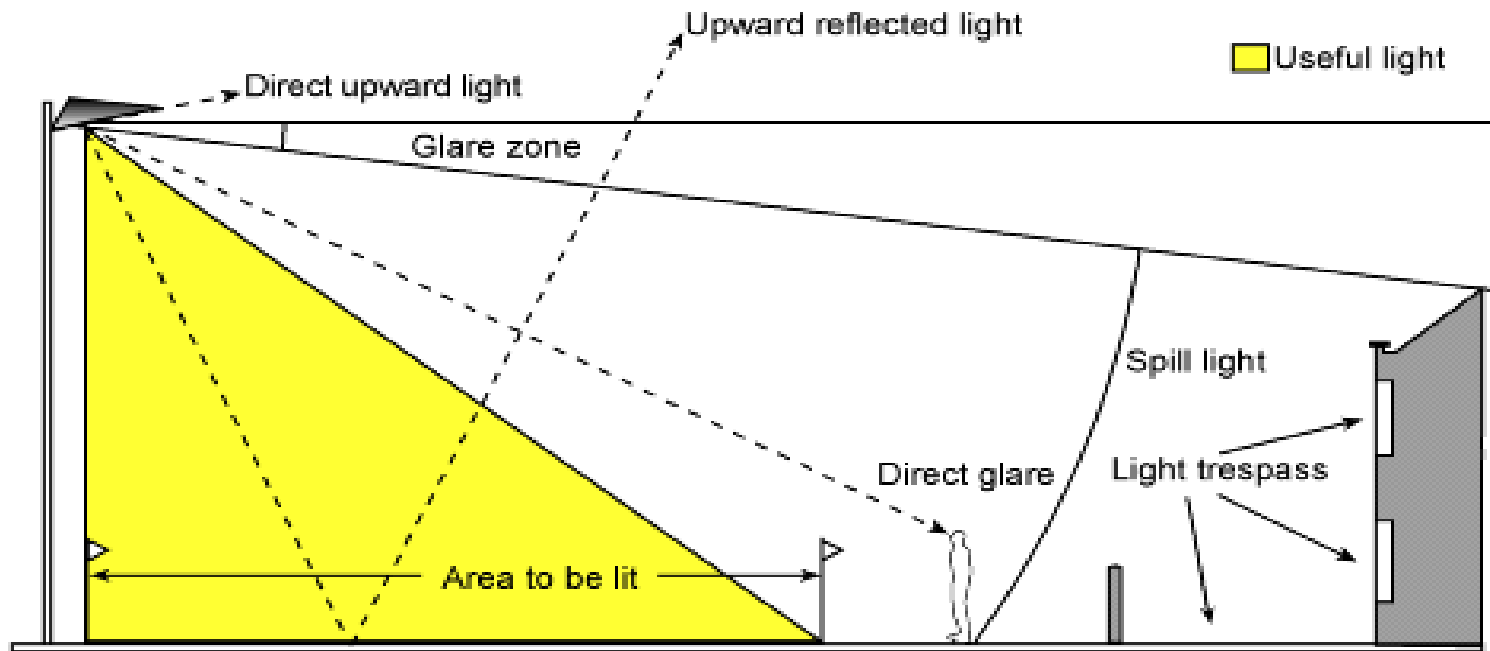


Glare

is the result of excessive contrast between bright and dark areas in the field of view.

Source: Earth Image and data processing by the National Oceanic and Atmospheric Administration (NOAA) National Geophysical Data Center. Data collected by the U.S. Air Force Weather Agency under the Defense Meteorological Satellite Program, 1994-1995

Useful light versus light pollution



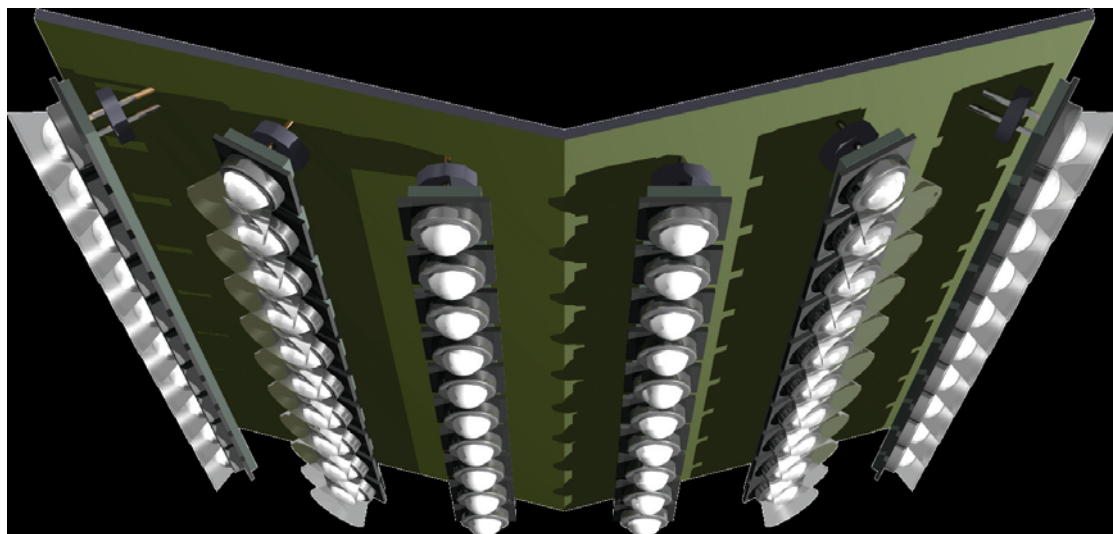
Light pollution is often caused by the way light is emitted from lighting equipment. Choosing proper equipment and carefully mounting and aiming it can make a significant difference.

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Source: Adapted from Institution of Lighting Engineers

Optical Optimization

- “Flat” designs proving to provide limited optical results. Many designers working on multi-board or angled systems

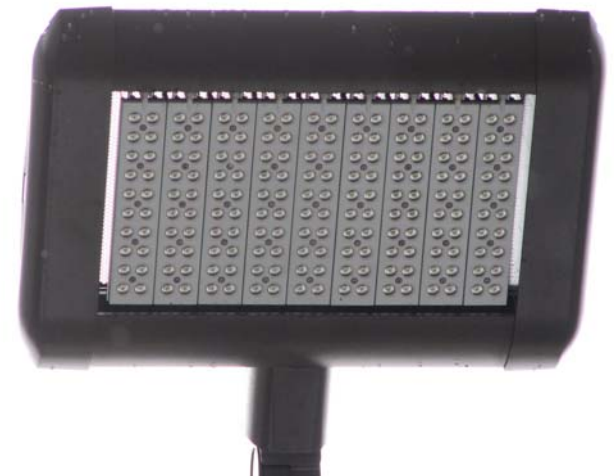


What's on the market with LEDs ?

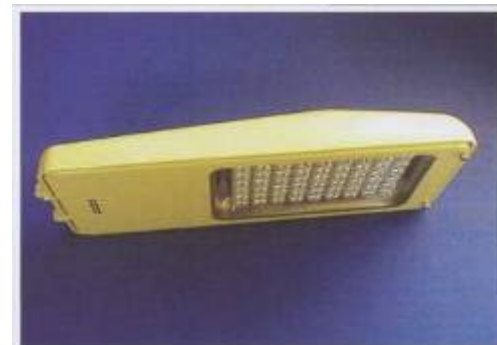
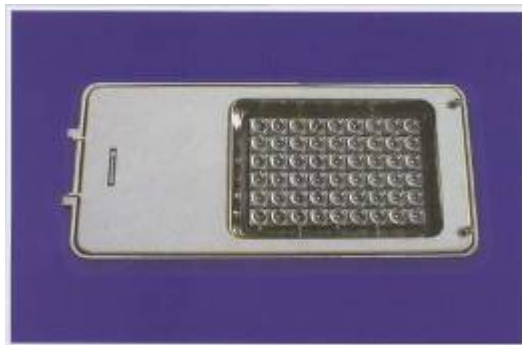
Cobra head retrofit



New Designs....typically flat



More...



Cities with LED street light programs



Split (Kroatië)
Schreder (Cree)



Toronto (Canada)
Leotek Electronics (Nichia)



Philips CityWing (Luxeon K2)
•Den Haag
•Oosterwolde
•Hoogeveen
•Dunes stores (Ireland)
•Spain

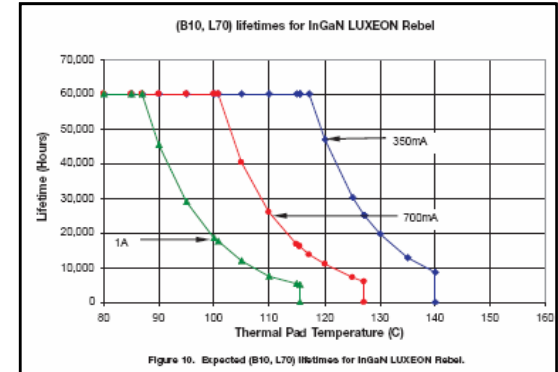
Example LUXEON Installation



Light Source	High Pressure Sodium	LUXEON Rebel
Lamp Style	Standard Acorn	Dark Sky (down-directed)
Power	85W (70 + ballast)	36W (total system)
Annual kWh	357	151
Power Savings kWh	-	58%
Maintenance	3-4 yrs	15 yrs

LUXEON Advantages

- Reliability: BL curves, 50k+ hrs
 - 365 days x 10hrs x 15 years = 54,750 hour lifetime
- Color Selection and Control
 - Cool or Neutral White Typically
 - Warm or color mixing in special applications
- Packaging: Low R_{th} , Efficient Optical Coupling
- FLS Support: Total System Integration

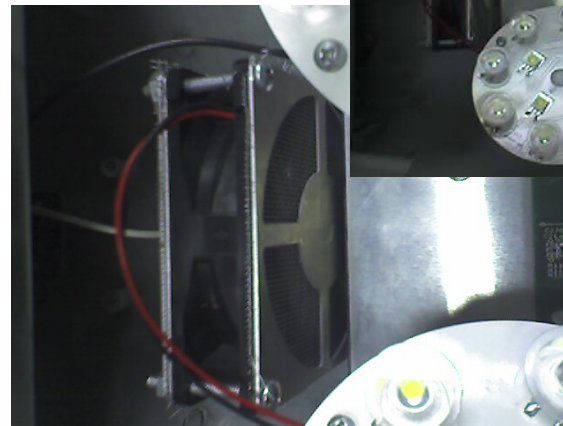
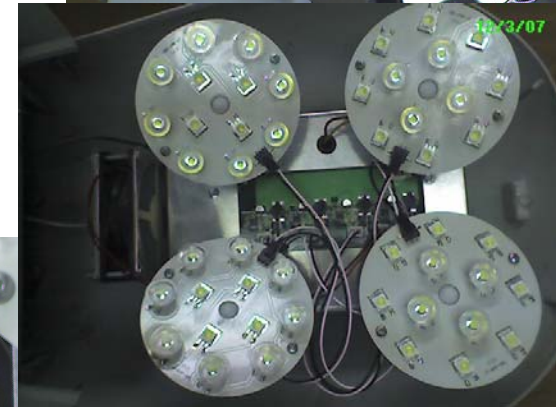
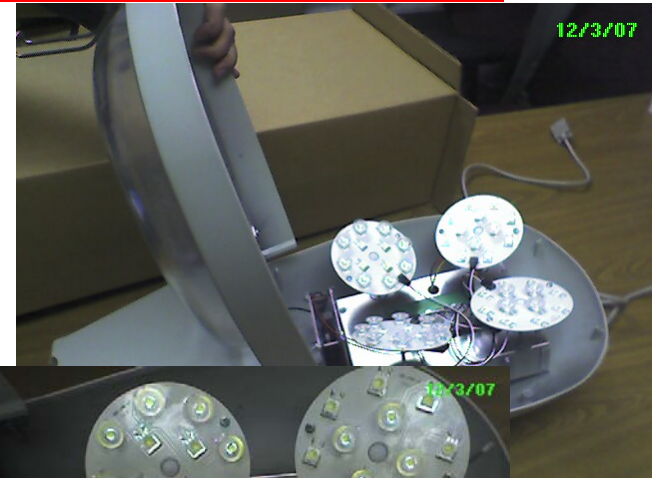


Selling a solution

- Total System Integration
- Proper Selection for:
 - Performance
 - Reliability
 - Efficiency
 - Volume supportability
 - Total Cost of Ownership



*This is **not** a LUXEON solution...*



“Full-featured” Lamp Post.

- Video Surveillance
- Security “sniffers”
- Antenna (Emergency Vehicle Traffic Switching)
- Remote Lighting Control
- Dimming
- Color Changing & Control
- Outage detection & communication
- Power Metering
- Wi-fi



Next Steps

- Target Customers: Who in your territory?
- Feedback to marketing for consolidation
- Customer engagements with Marketing
- Tools:
 - Design Concepts / Demos
 - Payback calculator

