

New Lighting Technologies

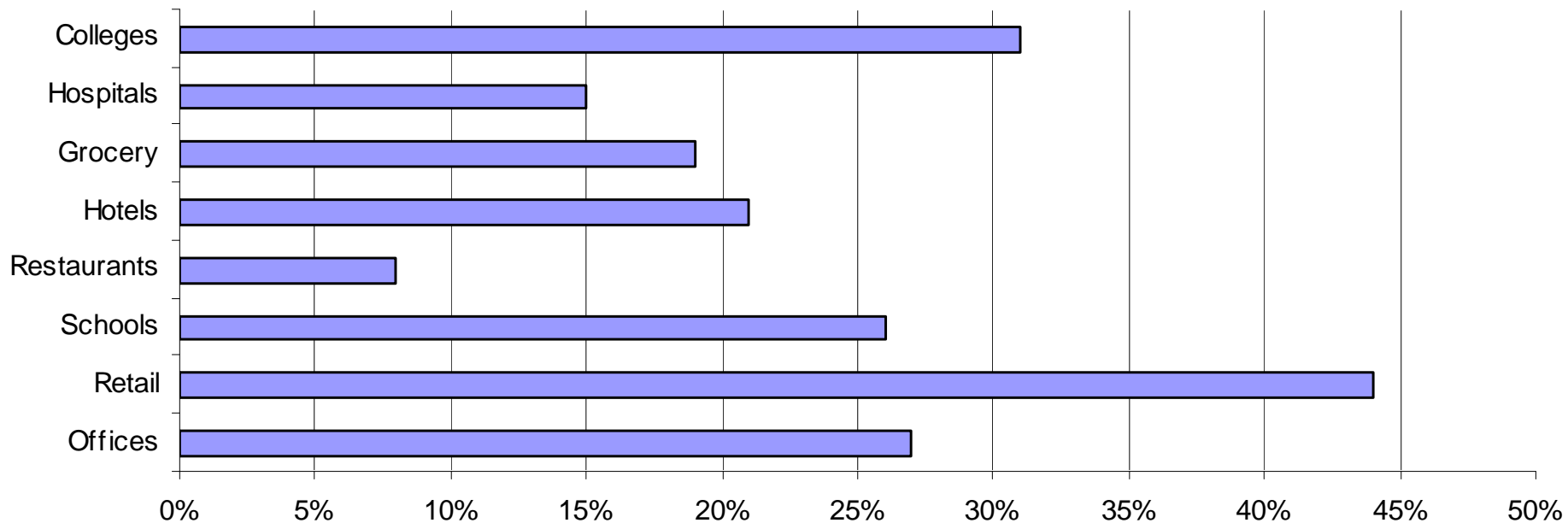
Brett Anderson, LC
FSG *bretta@fsgj.com*



Lighting Terms

Watt:

A term used to measure the amount of electrical energy consumed.



Lighting Terms

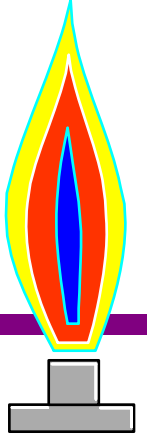
Lumen:

An international standard of luminous flux or **quantity of light**. A 60w lamp provides 840 lumens where as a dinner candle produces about 12 lumens. A lamps **efficiency** is measured in **lumens per watt** as a car is measured in miles per gallon.

Lumens Per Watt

- **Incandescent 10 - 20 LPW**
- **Halogen 15 - 25 LPW**
- **Halogen HIR™ 20 - 33 LPW**
- **Mercury 40 - 60 LPW**
- **Compact Fluorescent 55 - 80 LPW**
- **Linear Fluorescent 60 - 100 LPW**
- **Metal Halide 80 - 105 LPW**
- **Ceramic Metal Halide 90 - 105 LPW**
- **High Pressure Sodium 65 - 140 LPW**
- **Low Pressure Sodium 100 - 185 LPW**

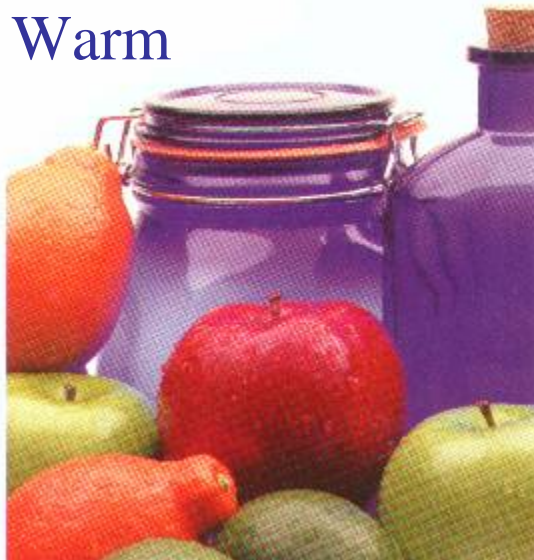
Color Temperature



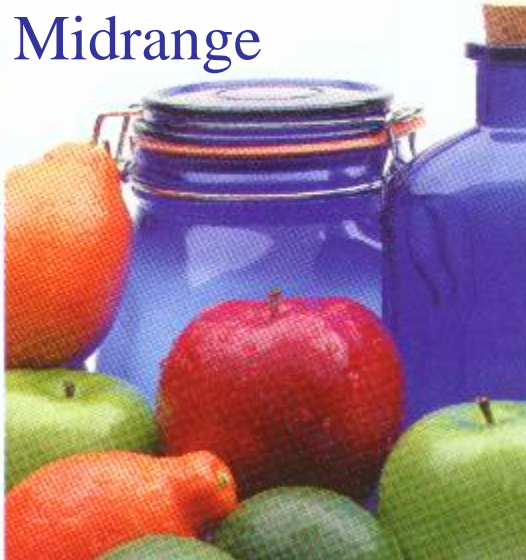
Describes the actual appearance of light produced, in terms of its “apparent” warmth or coolness.

Kelvin Scale
2200 - 7500 K

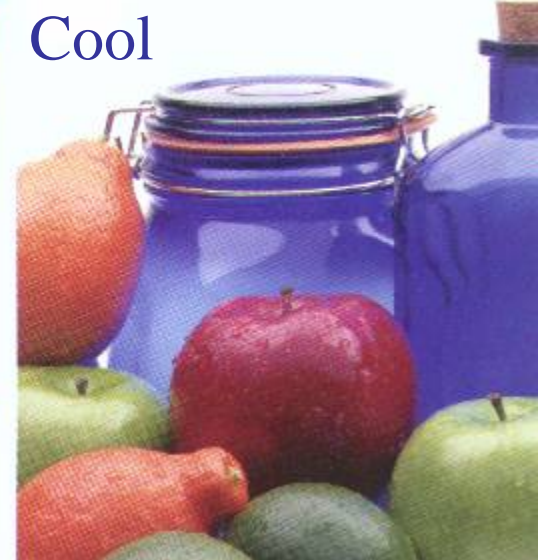
Warm



Midrange



Cool



Color Rendering Index



CRI measures the effect of a light source on the color of an object.

Utilizes 8 Reference Colors (CIE)

- * Scale of 0 to 100

- * Subjective

Note: You must compare like temperatures: ± 300 K

Color Rendition Index (CRI)

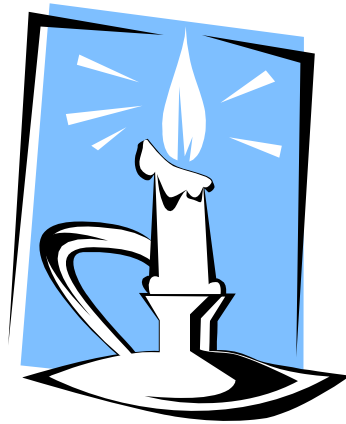
Color Rendering

Lamp Type	Typical CRI
Incandescent	100
Halogen	100
Compact Fluorescent	80-82
Fluorescent	49-90
Mercury	15-50
Multi-Vapor[®] Metal Halide	65-85
Lucalox[®] High Pressure Sodium	22-65

Lighting Terms

Foot Candle:

A unit of luminance. It is defined as the illumination on a surface one square foot in area on which one lumen of light is uniformly distributed.



Major Industry Changes

- Lower Wattage T8
- Lower Wattage T5 Lamps
- Universal voltage Ballast with greater range of BF
- Dimming and Energy Demand Ballasts
- CMH Ceramic Metal Halide
- Improved Quartz Lamps
- Induction Lamps
- Compact Fluorescents
- LED's
- Cold Cathode

Lower Wattage T8's

- T8's are now available in 25 watt & 28 watt versions from all leading lamp mfgs.
- Multiple BF Available



T8 VHO Amalgam System

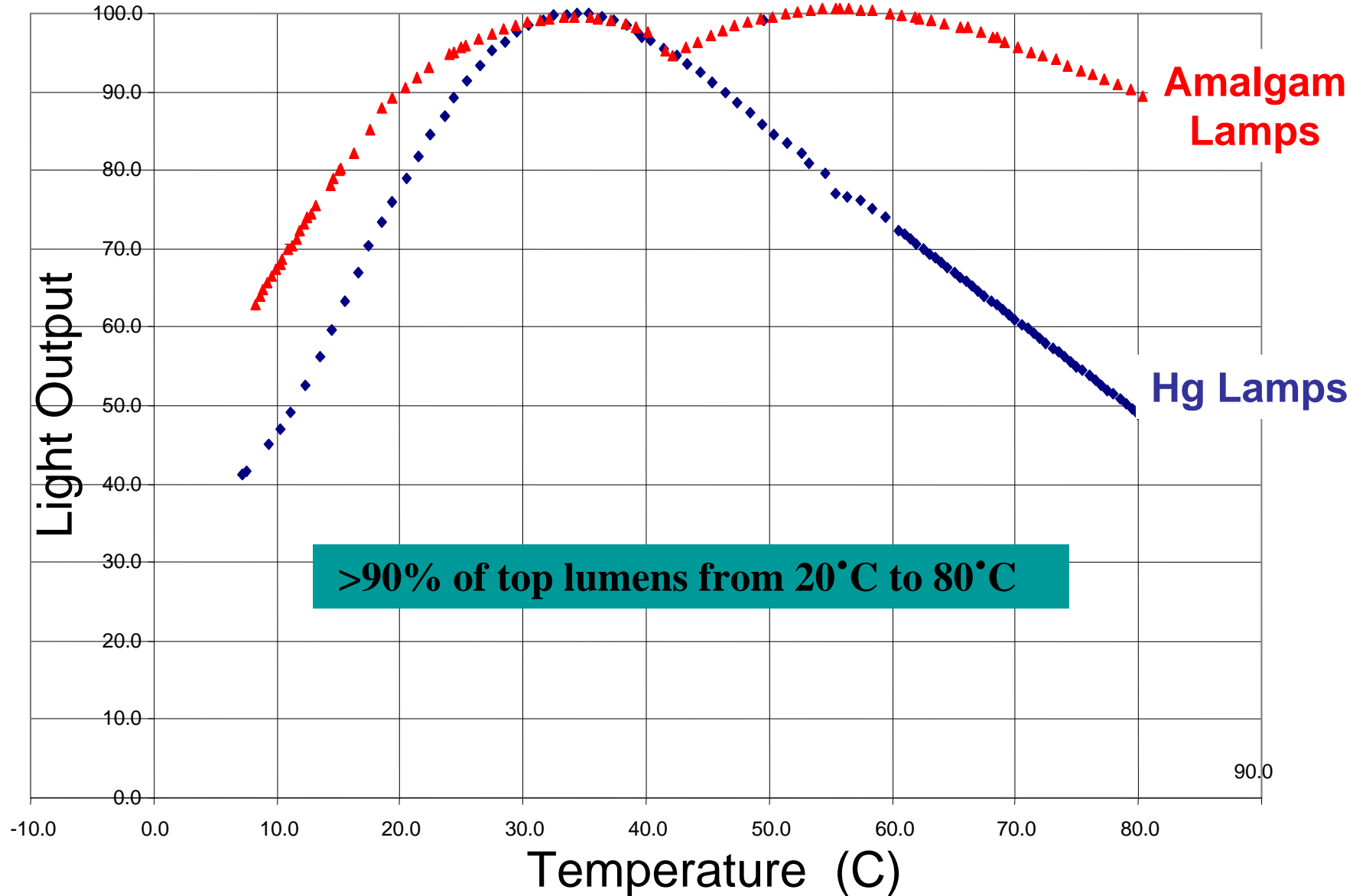
The solution for cold and warm applications and enclosed luminaires

- **7,000 lumens** - 40% more light than T5HO.
- Provides high light output over wide temperature range
- Can be used in fixtures currently designed for T8 lamps*



* thermal testing required

HO/VHO Amalgam



T8 Bi Level – Ballasts

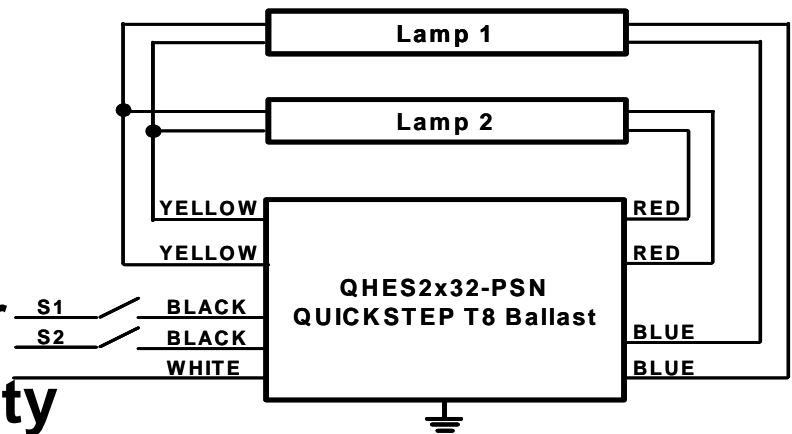
■ T8 Bi-level

- **High Efficiency**
- **Two light levels**
 - 55 watts @ 0.87 BF
 - 27 watts @ 0.34 BF

■ **PROStart[®]**

- Extends lamp life
- Use with Occupancy sensor

■ **Quick 60+ System Warranty**



2-Lamp QS (QUICKSTEP)

Full light output (full power)

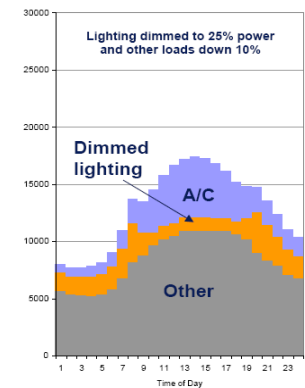
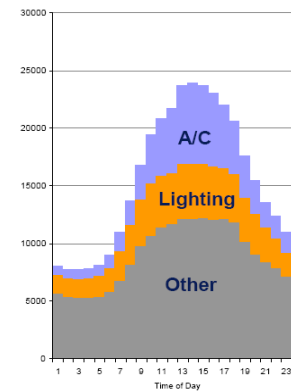
S1 & S2 closed (on)

Bi-level mode (50% power)

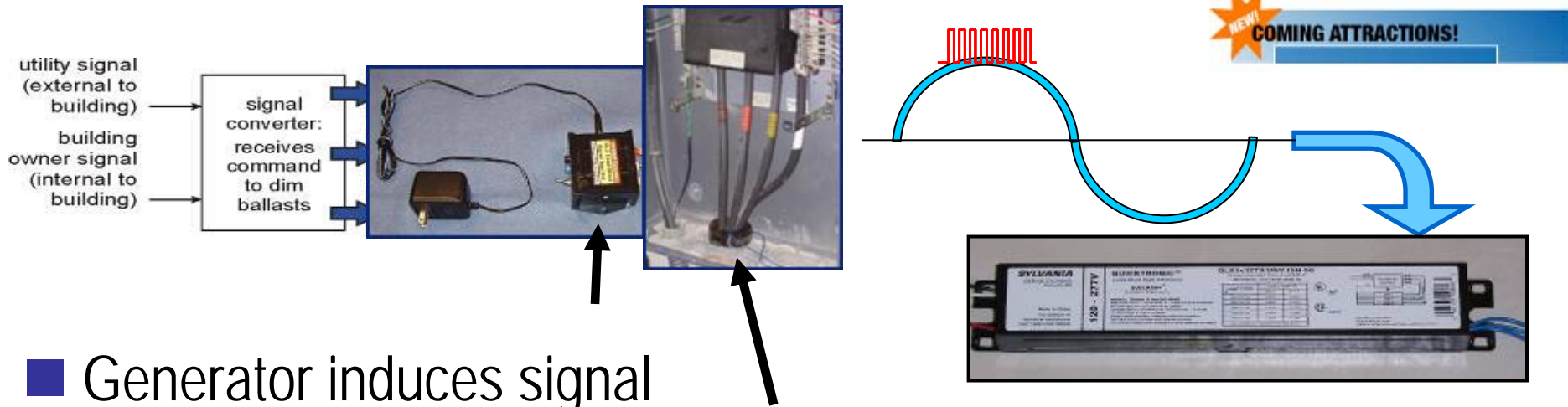
S1 or S2 closed (off)

Load Shedding Ballasts or Demand Response

- Cost-effective demand response technology
 - Reduce lighting power 33% and maintain reasonable light levels
 - NO Control Wires to ballasts & Easy to install
 - High-efficiency T8 ballast – 2, 3 & 4L models available late '07
- Controlled at Lighting Panel
 - Simply activated by closing a switch
 - Signal injector applies Power-Line Carrier signal to all branch circuits
 - Only Load shed ballasts recognize & react – other types unaffected
 - Can link to building or network systems for automated control



How Load Shedding Works



■ Generator induces signal controlled by 120v power supply
SPLIT CORE wraps around all 4 electrical leads

– Simple ballast installation
(no control wires)

– Peak load reduction

■ *33% power reduction*

– (Up to 200hrs/yr)



T5 Fluorescent Step Dim

- Available in 0.95 and 1.15 BF
- Programmed Start
- Lamp EOL Protection Circuit
- IntelliVolt® (108V-305V)
- “Step” reduces power (not light) by 50%
 - Meets California Title 24 requirements
- Avoids Article Theft Detection frequency
- Lamp starting temperature of 32°F
- PLUS 90 Warranty Protection

T5 Improvements



Energy Saving version
Higher Lumen version

Higher Efficiency Low Hg T5's

- PENTRON PREMIER is produced with a precise blend of three super efficient, rare earth phosphors and outperforms any comparable T5, T8, or T12 lamp on the market today.
 - Higher Lumens (3050) than conventional T5 Lamps.
 - Available in three colors: 3000K, 3500K and 4100K
 - Color Rendering Index of 85
 - PENTRON® lamps use less mercury, less glass and less phosphor than standard “environmentally friendly” T8 lamps
 - **2.5 mg Hg**

The highest efficacy in a
fluorescent lamp – 109 LPW!

Compact Fluorescents

CFL Update



Improved Performance
Instant Start
Dimming
Greater Variety & Shapes
Widely Accepted in
Commercial & Residential
Very Green
Lower Cost



65w CFL
Replaces 200w

Electrodeless Compact Fluorescents

DURA-One® electrodeless compact fluorescent lamps have a rated life of 15, 000 hours or 13 years.

Long life 15,000 hours

- Instant brightness
- Low temperature starting (-20°F/-29°C)
- Unlimited switching cycles
- Greater light over a wider temperature range
- Optimize total cost of ownership
- Dura-One A19 Energy cost savings of up to \$82 vs. 75W incandescent A19
- Dura-One BR30 Energy cost savings of up to \$63 vs. 65W incandescent BR30

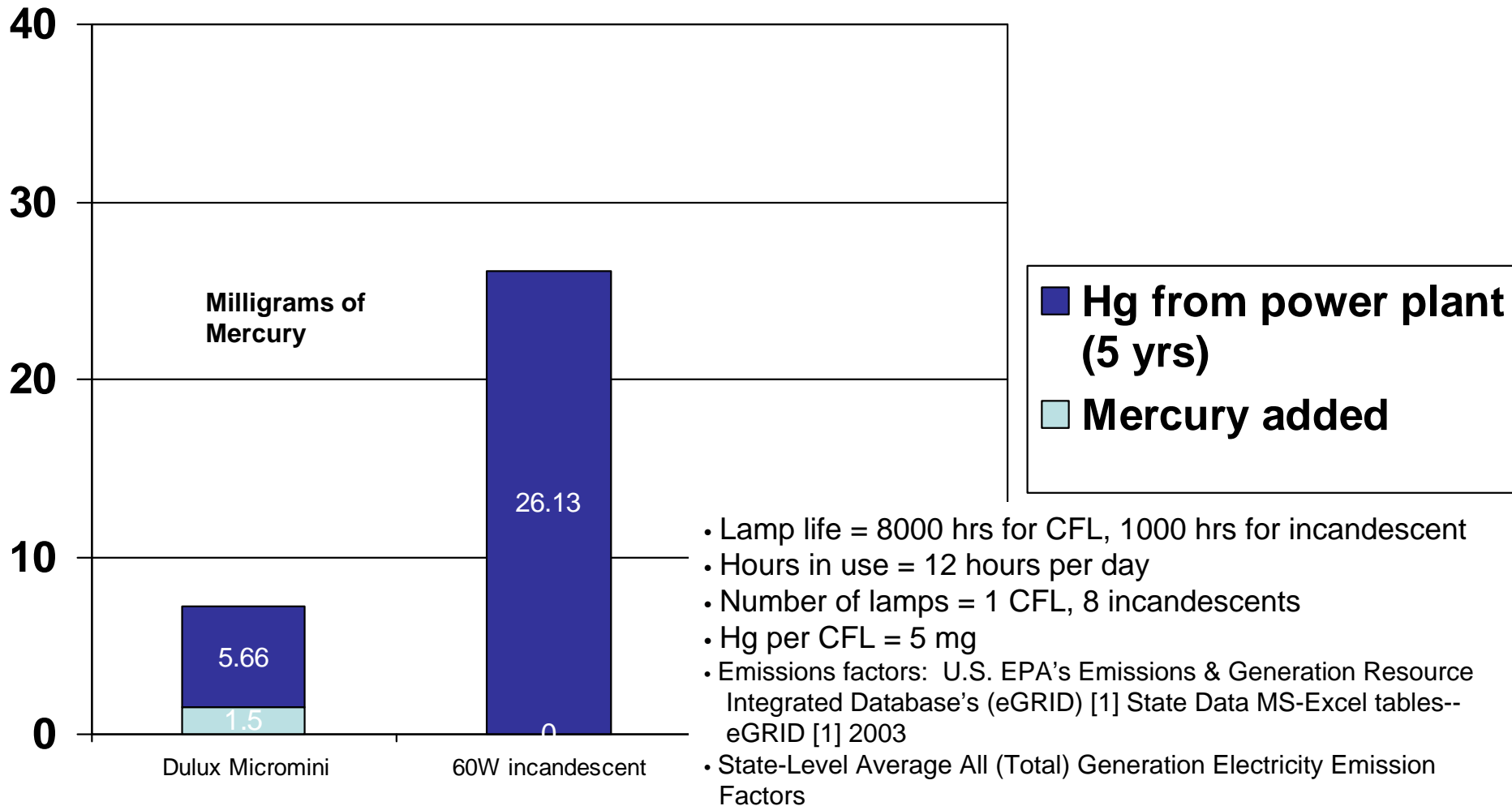


**23W
BR30**



**20W
A19**

Mercury Update



LED's



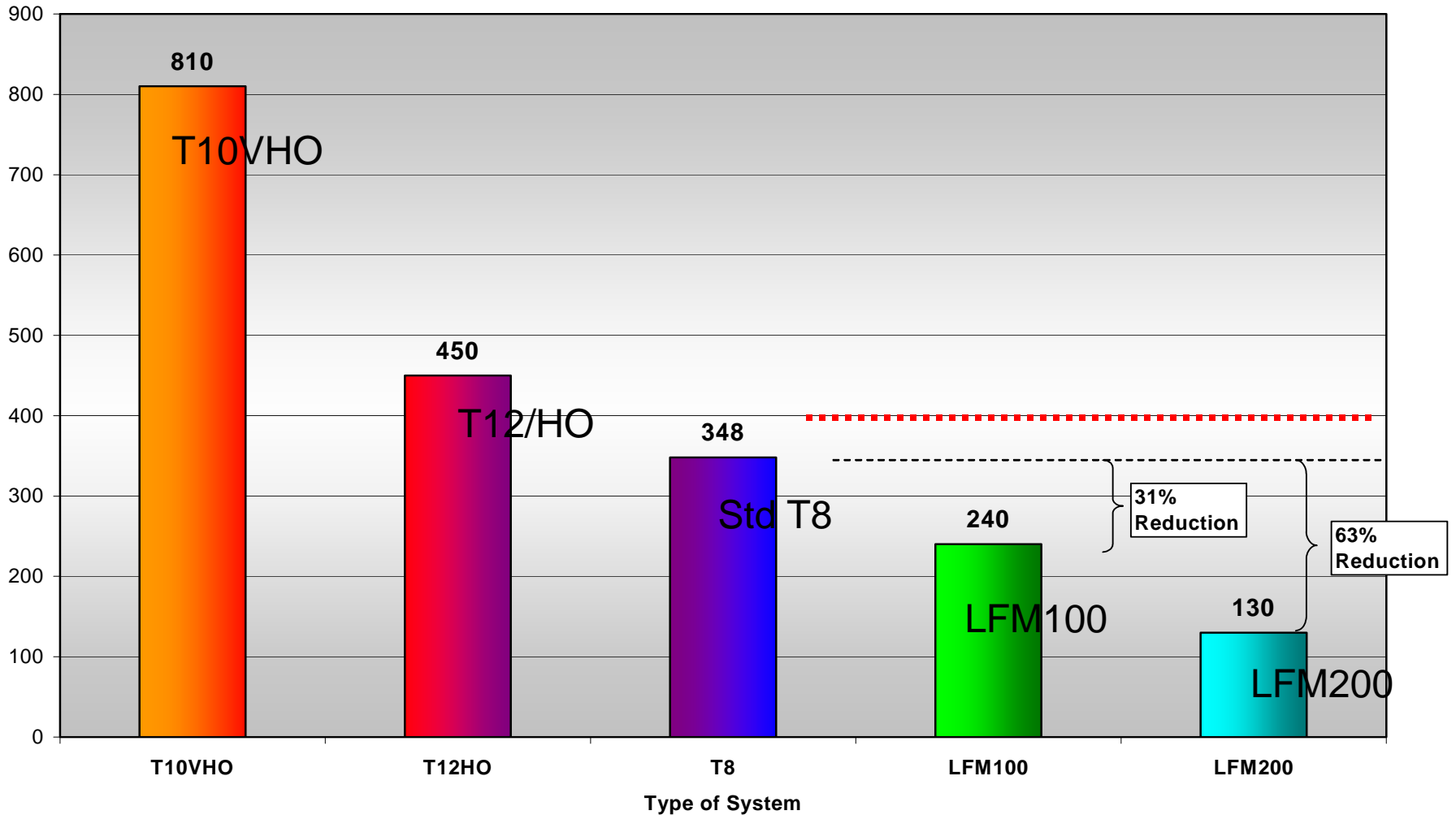
LED's



5-Door Case Comparison

5-Door Case Power Consumption

Watts



Directional LED

Features:

- Luminous intensity of up to 700 candelas
- Pre-wired with 15.7 inch polarized cables for easy installation
- Dimmable
- Available with integrated optic in 25° or 38° beam angles for flood lighting applications

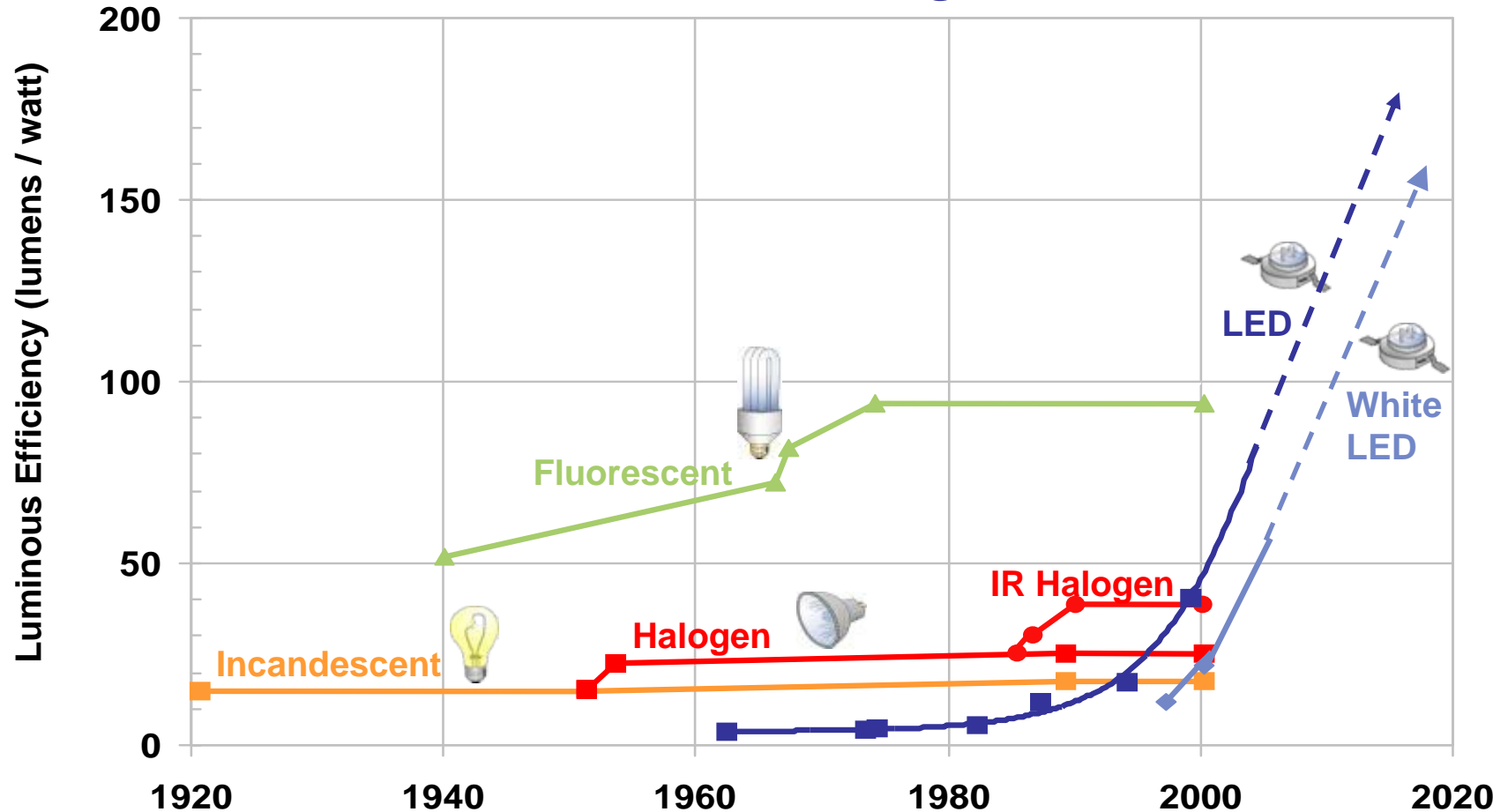
Benefits:

- No ultraviolet or infrared radiation
- Potential service life of up to 50,000 hours



What's Happening

The efficiency of solid-state sources is eclipsing that of incandescent and halogen sources



CHM Metal Halide

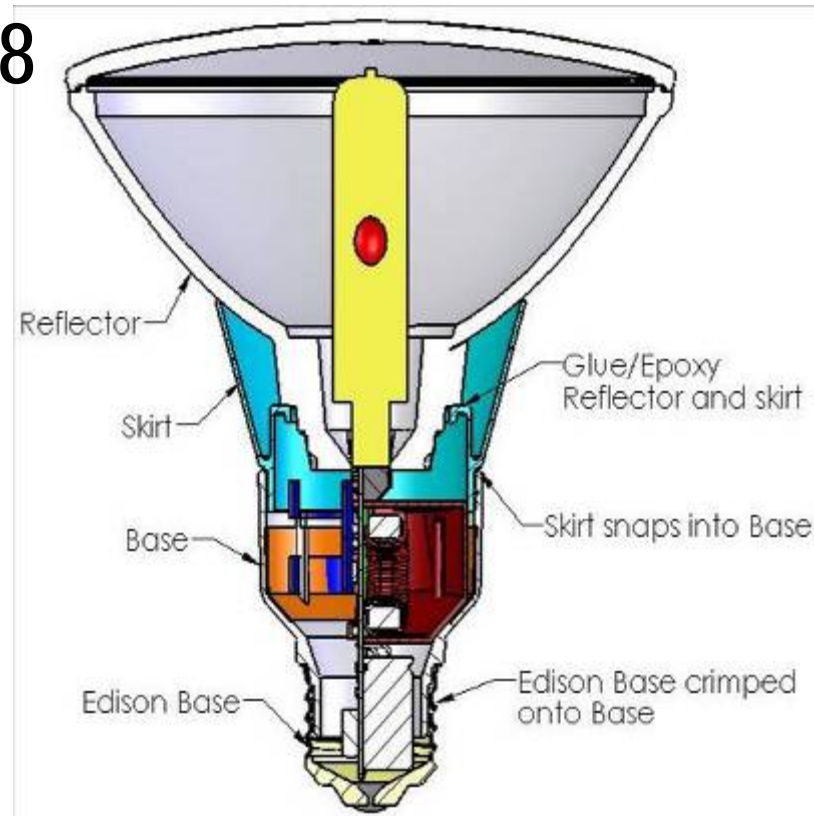
Improved CRI
Longer Life
Multiple Sizes
Several Wattages
Beam Pattern Options



Quartz IR Improvements

- **HIDi (25W integrated PAR38 Powerball[®])**

- 25W@120V input
- 10,500 hrs
- 1,220 lumens
- 3,000K CCT
- 83 CRI
- 10°, 25°, 40° lenses
- Available March 2008



Metal Halide 1000W → 750W Replacement

- Specify in place of 1000W Metal Halide
- Product Features:
 - Excellent Lumen Maintenance
 - Reduced color shift
 - Compact BT37 jacket
 - Base-up through **Horizontal Lamp**
- Benefits:
 - Energy savings over 1000W
 - Utility rebate if applicable



Electronic HID Ballasts

Increase Efficiency 20-40%
Lower Lamp Lumen Depreciation
Cooler Operating
Eliminate Flickering
Longer Life



Electronic HID Ballasts

Benefits

- Increased energy savings
- Fewer luminaires or lower wattage
- Longer useful lamp life
- Improved lumen depreciation
- Quiet operation
- Low ballast losses
- Controllable with sensors/programmir
- Smaller footprint, lighter weight ballas
- Multiple wattages with one ballast



High Frequency Operation

Benefits

- Reduced stroboscopic effect
- High power factor through dimming range
- Minimal color shifting while dimming
- Improved lamp lumen depreciation
- Improved ballast efficiency

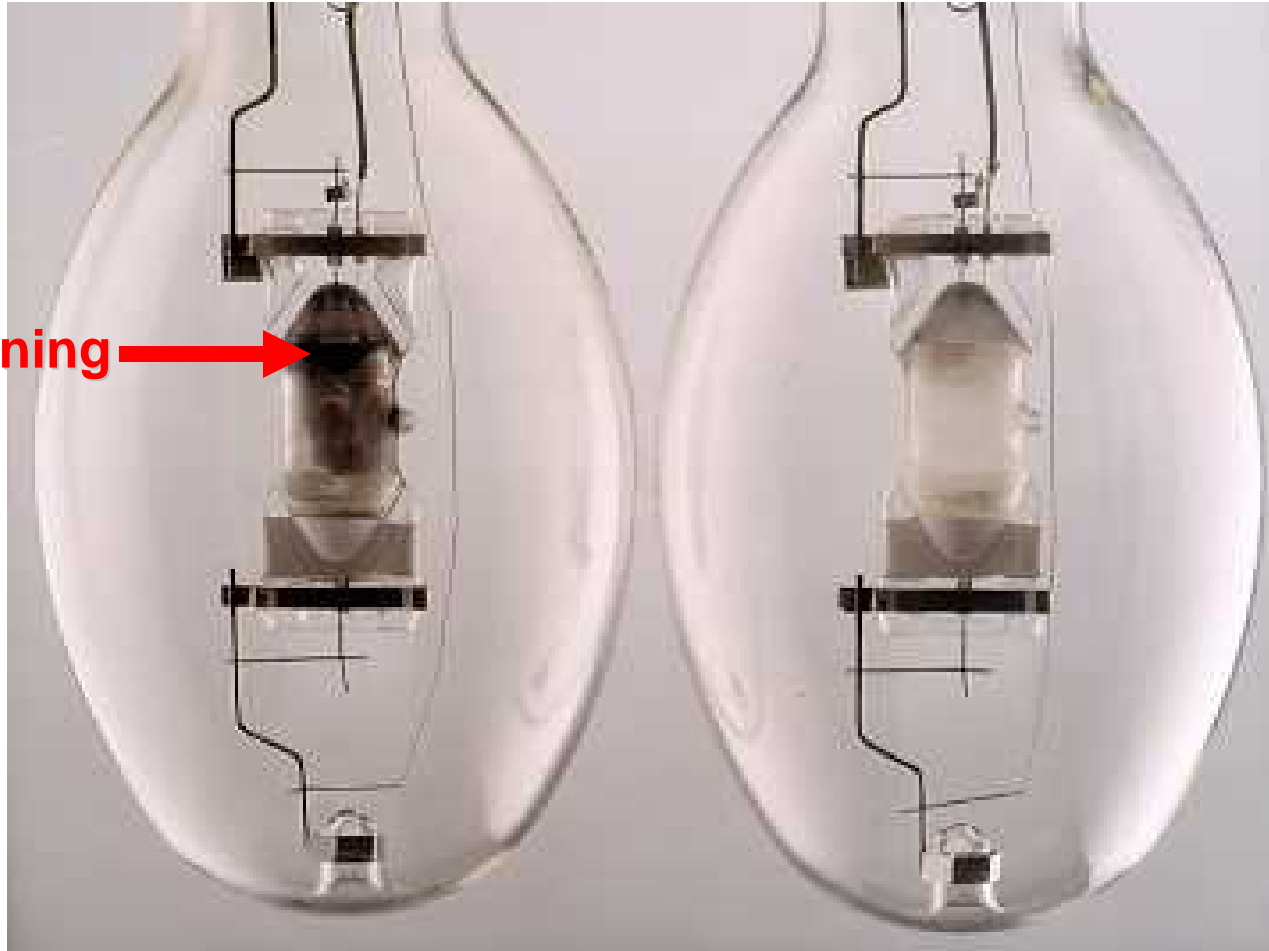
	Initial Lumens	<u>Magnetic</u> Mean Lumens	<u>Electronic</u> Mean Lumens	Gain
400MH	36,000	23,400	27,000	15%
400 PSMH	42,000	31,000	35,280	14%
320 CMH	37,500	28,125	31,875	13%

Actual test at 4000 burn hours

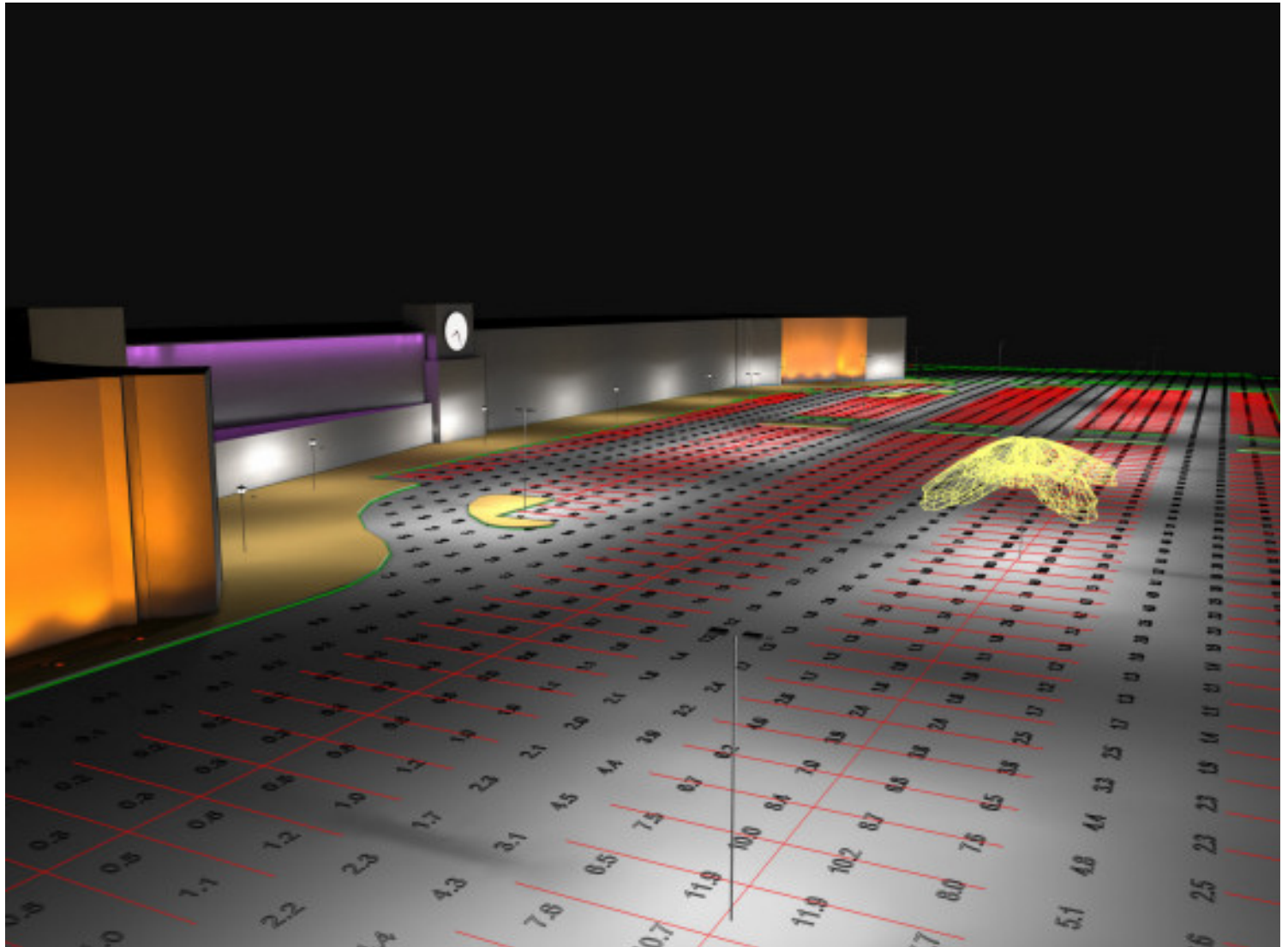
400w
Magnetic

400w
Electronic

Darkening →



Hot new lighting software from AGI



Questions?

