Street Lighting
Street Lighting

- Street Lighting Inventory
- Design Goals
- Technology
- Future
Street Lighting Inventory

- 60 Million “Cobra-head” fixtures in the US.\(^1\)
- 31 Million Decorative Street fixtures in the US.
- 54% of all Municipalities own and maintain their street lights.\(^2\)
- 32% are owned and maintained by Utilities.\(^2\)
- 14% are a derivative of the above.\(^2\)

1. Source - DOE
2. Source – LD&A
Street Lighting Inventory

- Average burn is 12 hours per day.
- The average fixture wattage is 187 watts.¹
- Roughly total of >31 TWh/yr. (TWh -1 terawatt-hour per year = 114 megawatts)¹
- Estimated 8% of the electricity used nationally annually.¹

¹ Source - DOE
Street Lighting Design Goals

- **Visibility** - Helps drivers maneuver in inclement weather
- **Economics** – Saving energy and reducing liability cost
- **Aesthetics** - Helps with Shadowing and reducing Glare
- **Safety** – helps drivers negotiate pedestrian crossings, pathways and activities close to the road
- **Environment** - control Light pollution and trespass
Street Lighting Design Questions

- IES Roadway Classification - Freeway(A or B), Expressway, Major, Collector, Local, Interchange(A or B), Alley, Sidewalk, etc.
- Area Classification – Commercial, Intermediate and Residential
- Pavement Luminance – Material Reflectance
- Light Distribution Classification – Directional control
- Lighting System Geometrics – Luminaire mounting height
- Pole Spacing – existing or new layout
Street Lighting Technology

STREET LIGHTING SOLUTIONS
Technology - Induction Lighting

• **Features** –
  – Long life 100,000 hrs to L50
  – Energy Efficient 80Lm/W
  – Color Rending index 80-90
  – Color Temperature
  – Cost?

• **Drawbacks** –
  – Temperature above 35° C/95° F
  – Effective Control of the Light they emit
  – Ballast life 65K hours & recommend relamp
  – 1 or 2 product Made in USA
  – Limited 5yr warranty
Technology - LED Lighting

- **Features** –
  - Extremely long life 70,000+ hrs to L70
  - Energy Efficient 100Lm/W
  - Color Rending index 80-90
  - Color Temperature
  - Effective control of the light emitted
  - 5 – 10 yr Limited Warranty

- **Drawbacks** –
  - Cost?
  - Temperature above 60° C/140° F
  - To many manufactures
  - Interpretation of Standards
  - Limited ARRA product
Street Lighting Technology LED Retrofit

- **Features** –
  - Cost is 1/3 of new fixture
  - Extremely long life 70,000+ hrs to L70
  - Energy Efficient 100Lm/W
  - Good Color Rending index 80-90
  - Color Temperature
  - Effective control of the light emitted
  - 5 – 10 yr Limited Warranty

- **Drawbacks** –
  - Temperature above 60° C/140°
  - Flexibility of Kits(adaptability/lumen output)
  - Limited ARRA product
Street Lighting Technology LED Retrofit

• Features –
  – Long life 100,000 hrs to L50
  – Energy Efficient
  – Color Rending index 80-90
  – Color Temperature
  – Cost?

• Drawbacks –
  – Temperature above 35° C/95° F
  – Thermals design to fixture
  – Effective Control of the Light they emit
  – Ballast life 65K hours & recommend relamp
  – 1 or 2 product Made in USA
  – Limited 5yr warranty
Street Lighting Technology Comparison

**Induction**
- Limited Testing Standards
- 100K hrs life to L50
- 30% lumen reduction at 60K hrs of life
- Limited control
- Recommended lamp replacement with driver replacement
- Not optically directional
- Not easily Disposable

**LED**
- LM-79, LM-80, TM-21
- 70K hrs life to L70
- 30% lumen reduction at end of life
- Highly Controlable
- Optically Directional
- Easily Disposable
Street Lighting Technology Specifications

Specification points:

- Architectural Appeal
- Total Internal Reflector (TIR) – Specially designed acrylic lens over each LED that directs the light to specific points on the roadway. Distributions meetings Classification Recommendations
- DLC, LM-79, LM-80, In Situ and TM-21
- Type 2-5 Distributions
- UL /ETL Listed – Entire fixture is listed, not just component parts.
- IP67 minimal
- Easy installation and access via removable door assembly
- Ease of maintenance
- Minimum 5 Year Warranty, Made in the USA
Street Lighting Design Questions

- DLC – Design Lighting Consortium – Established to ensure that only high-quality, high-performance, tested and verified LED products will be eligible for rebate participating programs.
- LM-80 – test methodology by which LED chip manufacturers can measure light output degradation over time.\(^3\)
- In Situ – the best indicator of the quality of the thermal design of a given fixture, and is also directly related to fixture lifetime.

\(^3\) – Source DOE/SSL
Street Lighting Design Questions

- **LM-79** – IES Approved Method for accessing absolute photometry and performance data for the entire integrated fixture.\(^3\)

- **TM-21** – provides a method for determining a LED luminaire expected operating life using data collected per LM-80 and L70 testing.\(^3\)

\(^3\) – Source DOE/SSL
Street Lighting Future

• Ca Title 24 Part II
  – Photocontrol or astronomical time switch on all exterior lighting for Daylight
  – Outdoor lighting must be controlled by an automatic schedule
  – All Outdoor lighting mounted below 24 ft shall have motion sensor dimming to 40% min/80% max.
  – Outdoor Sales frontage, lots and canopies below 24 ft can have centralized time-based zone control opposed to motion.
  – When >10% of fixture are retrofitted refer to previous requirements.
Street Lighting Future

- Ca Title 24 Part II - continued
  - Exemption for safety lighting
  - All luminaires with > 150 w shall meet required BUG ratings (IES TM-15-11)

How does this effect you?
Controls and Tighter Regulations
Use Common Sense in Product Choice.

2. Osram LED - “Lighting Options by Space or Area – Streets, Roadways and Urban Thoroughfares” - credited to IES