SCN Efficiency Work Group Meeting

LED PRESENTATION
History Lesson

Light Sources
- Incandescent 16 lm/w 2700K
- Mercury Vapor 35-65 lm/w 3700K (coated)
- HPS/MH 75-125 lm/w 2200K/4000K

Internal reflectors for distribution

High internal losses,
- 55%-60% gets out of the fixture
- Hot spotting below the fixture
- Max distance on center 75’ or so

<table>
<thead>
<tr>
<th>Technology</th>
<th>CRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incandescent</td>
<td>100</td>
</tr>
<tr>
<td>Metal Halide</td>
<td>70 - 90</td>
</tr>
<tr>
<td>LED</td>
<td>70 - 75</td>
</tr>
<tr>
<td>High Pressure Sodium</td>
<td>21</td>
</tr>
</tbody>
</table>
Why LED’S?

- Light quality
  - Dark Sky Compliant – Full cut off fixture
  - Control over distribution patterns
  - CRI – Color Rendering Index

- Public Safety

- Reduced Maintenance

- Energy Savings
What is an LED

- Semiconductor
  - First made around 1962
  - Indicator lights
- Longest lasting source of light
- Blue LED’S for the most part used for lighting applications
  - Phosphorus used to warm light as low as 2700K
Color Temperature

**Basic LED Reference Example**

- 7000K
- 5700K
- 4000K
- 3500K
- 3000K
- 2700K

**Kelvin Color Temperature Scale Chart**

- 10,000K: Blue Sky
- 7,000K-7,500K: Cool White Seesmart LED
- 6,000K: Cloudy Sky
- 5,500K-6,000K: Day White Seesmart LED
- 4,800K: Direct Sunlight
- 4,000K-4,500K: Natural White Seesmart LED
- 4,000K: Clear Metal Halide
- 3,000K: 100W Halogen
- 2,800K: 100W Incandescent
- 2,700K-3,200K: Warm White Seesmart LED
- 2,200K: High Pressure
- 1,900K: Candle
Photometrics

- 70W HPS
Photometrics

- 25W GE LED
## Wattage Translations to LED

<table>
<thead>
<tr>
<th>HPS Fixture Wattage</th>
<th>Equivalent LED Fixture Wattage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 – 70W</td>
<td>17 – 22W</td>
</tr>
<tr>
<td>100W</td>
<td>35 – 44W</td>
</tr>
<tr>
<td>150W</td>
<td>55 – 70W</td>
</tr>
<tr>
<td>200W</td>
<td>73 – 87W</td>
</tr>
<tr>
<td>250W</td>
<td>90 – 101W</td>
</tr>
<tr>
<td>400W</td>
<td>139W +</td>
</tr>
</tbody>
</table>
General Trends

- Cities and Towns Converting to LED
- Mostly on the East and West Coast
  - Power is expensive, $.12-$1.18+/ kwhr
- Many Projects using a Full Turn Key Model
Fixture Manufacturers

- GE
- CREE
- Leotek
- American Electric (AEL)
- Philips
- Cooper

- Decorative Fixtures
  - DLC equipment & 10 yr Warranty
LED Major Points

- Dark Skies
- Light Trespass
- General Distribution of HID fixtures
- LED Efficiencies, 90-135 lm/w
- Ambient Temperature Requirements for Arizona
  - Few manufacturers meet current High Temp Requirements
Maintenance

- HPS 18-22% regular maintenance over the course of a year
- LED > 1% regular maintenance per year
- Long Term
  - Tree Trimming
  - Cleaning, webs, insects, etc
- Day to day maintenance retracts to “real” events
  - Power outages, Knock downs, Wire theft, Capital work
Controls

- What can they offer
  - Dimming
  - Remote Monitoring and Maintenance
  - Wire theft/ outage detection
- Costs, $125-$200 per pole
- Long Tern Vision
  - Smart Cities
  - Parking
  - Traffic Control
  - WiFi
What now?

Options for getting it done

- RFP
- Sole Source
- US Communities
Full Turn Key
(Cafeteria Plan)

- Audit – GIS of entire street light system
  - Reconcile audit data against Utility records
- Design
  - Product Agnostic: DLC, 10 yr warranty
  - Photometric Calculations/Runs
  - Samples and Field Testing
- Procurement
- Installation – Subcontracted out
- Commissioning
Street Light Market

- Energy Service Companies (ESCO’s)
  - Guaranteed Savings Contracts, Street Lighting already a guarantee
  - Cover Wide Variety of Measures, Street Lighting is just one
  - Typically Street Lighting the most lucrative, used for other weaker measures

- Smaller local Firms
  - Inexperienced design and market context

- Single Measure ESCO/Consultants
  - Focus Solely on Street Lighting
Typical issues

- Audit results
- Faulty wiring
- Tripped contactors
- Blown fuses
- Faulty photocells
Utility Rates

- **Flat Rate per Month**
  - $.$/KWhr * KWhr usage
  - KWhr based on actual in a month or yearly average

- **Base Charge + $.$/KWhr * KWhr usage**
  - KWhr based on actual in a month or yearly average

- **Meter Grade Controls**
  - **Meter for Actual Usage**
    - Capture Savings from Dimming
    - Share Data with the Utility
Financing

- Bonds
- Lease Purchase Financing
- On Bill
- Internal Funding

Cost Benefit Analysis either way needed
- Cost of Project
- Paybacks
- Itemized costs per pole format
  - Eliminates Change orders
Summary

Be clear in what you want

Have not done this before

Get it right the first time, Don't want to do it again

Get Great Advise, Pay a Reasonable Price

Connect to other Cities who have done this before

There is no right or wrong way

This is about what you want, It’s your experience
Questions?