Retrofits: Decision Made, What’s Next?

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Benefits of Retrofits

- Energy Savings
- Improved Lighting Quality
- Reduced Costs in Maintenance and Labor
- Reduced Pollution
- Green Power Systems
What to Retrofit

- Luminaire
- Sensors
- Controls
- Environment (retro-reflectivity)
- Use of Space

IESNA Recommendations

<table>
<thead>
<tr>
<th>Area</th>
<th>Time of Day</th>
<th>Minimum Horizontal Illuminance (fc)</th>
<th>Uniformity Ratio (max:min)</th>
<th>Minimum Vertical Illuminance (fc)</th>
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</thead>
<tbody>
<tr>
<td>Basic</td>
<td></td>
<td>1.0</td>
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<tr>
<td>Ramps</td>
<td>Day</td>
<td>2.0</td>
<td>10:1</td>
<td>1.0</td>
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<tr>
<td>Ramps</td>
<td>Night</td>
<td>1.0</td>
<td>10:1</td>
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<tr>
<td>Entrance</td>
<td>Day</td>
<td>50.0</td>
<td>10:1</td>
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<tr>
<td>Stairs</td>
<td></td>
<td>2.0</td>
<td>10:1</td>
<td>0.1</td>
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</table>
How to Chose

- Conduct a Product Survey
- Obtain Product Literature
- Speak with Professionals (CLTC)
- Meet with Manufacturer’s Rep
- Match Products with Performance Requirements
- Obtain Samples
- Compare Costs with Features

**HID**
$250 - 450

**FLUORESCENT**
$150 - 275

**LED**
$300 - 1200
Parking Structure Lighting

Induction

- **Green Advantages**
- Low energy – ½ of MH, HPS and T12
- Long life vs. MH and HPS – 6 to 7 times length
- Low CO₂ emissions – about .84 metric tons per fixture per year
- Reduced mercury content vs. MH and HPS
- Good warranty – 5 year ballast and lamp (parts and labor)
- Long life makes it Most Sustainable of all options
- Lowest installation cost with quick mount
- Instant on/off and controllable
- Excellent for a one-to-one replacement well within IESNA min/max
Parking Structure Lighting

Fluorescent

Green Advantages

- Lowest first cost
- Low energy – approx. ½ of MH, HPS and T12
- Long life vs. MH and HPS – 2 times length
- Low CO2 emissions – about .84 metric tons per fixture per year
- Reduced mercury content vs. MH and HPS
- Good warranty – 5 year ballast
- Major players in lamp technology: Sylvania and Philips
- Instant on/off
Walkway Lighting

200+w HPS retrofitted with 100w bi-level induction bulb in partnership with CLTC

- Simple upgrade to newer technology
- Original fixture is reused
Traffic Signal Lighting

**LEDs**
- 5 – 10 Yr Lamp Life vs. 1 Yr for Incandescent
- Less Failure and Not Catastrophic
- 82%- 93% Energy Savings

**Annual Savings**
- 159,756 kWh
- ~$21,000 @ 13¢/kWh
- 114 metric tons of CO$_2$e

**Results**
- Substantial Maintenance Savings
- Improved Safety/ Reliability
- Reduced Liability
- Battery Backups more efficient
Street Lighting

<table>
<thead>
<tr>
<th>Measure</th>
<th>HPS</th>
<th>Induction</th>
<th>LED</th>
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<tbody>
<tr>
<td>Efficacy Lumens</td>
<td>110</td>
<td>85</td>
<td>45</td>
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<tr>
<td>CRI Index</td>
<td>21</td>
<td>80</td>
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</table>

~2100 Kelvins

~6000 Kelvins

Courtesy of MAGNARAY INTERNATIONAL, Inc. and Marine Corp Base Hawaii (MCBH).
Sharing Information

Metal Halide to Induction Light Conversion

step 5 Remove internal components
We will not be reusing any of the internal components or wiring from the metal halide system so you can remove them now.

Should end up with a bare case that we can begin installing the induction components into.

2009 CAMPUS LIGHTING RETROFIT FORUM
Thank You

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