

# Green Street Lighting

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## Fact vs. Fiction



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# Terminologies

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- ***Green***
  - Reducing environmental impact
- ***Conservation***
  - Reducing energy usage to save money



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# Legislation

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- ***2005 Energy Policy Act***
  - Banned mercury vapor ballast
- ***Energy Independence and Security Act***
  - Incandescent phase out 2014
  - Switch to pulse start metal halide
- ***NJ Master Plan***
  - 20% reduction by 2020



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# PSE&G's Street Light Technologies

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- ***Existing***

- Incandescent
- High Intensity Discharge
  - High Pressure Sodium
  - Mercury Vapor
  - Metal Halide

- ***Proposed***

- Induction
- Light Emitting Diode (LED)



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# Existing Technology:

Light Source	Advantages	Disadvantages
<b>Incandescent</b>	<ul style="list-style-type: none"> <li>o cozy/hometown light- some perceived "historic" value</li> <li>o not "too bright"; little trespass light issues</li> <li>o inexpensive</li> <li>o warm color rendition</li> <li>o fits into almost all existing fixtures</li> </ul>	<ul style="list-style-type: none"> <li>o high maintenance – frequently burn out</li> <li>o relatively low light levels</li> <li>o short life normally – shortened by moisture</li> <li>o inefficient: low lumen output per energy input</li> </ul>
<b>HID* mercury vapor (MV)</b>	<ul style="list-style-type: none"> <li>o bluish/white light has good color rendition</li> <li>o long-lasting, hardly ever burn out</li> <li>o inexpensive</li> <li>o fits into almost all existing fixtures</li> </ul>	<ul style="list-style-type: none"> <li>o light output fades away over time</li> <li>o mercury content is a major environmental issue</li> <li>o US has banned production of new MV fixtures as of 1/1/08</li> <li>o to be phased out completely by 2012</li> </ul>
<b>HID* metal halide (MH)</b>	<ul style="list-style-type: none"> <li>o excellent color rendition</li> <li>o relatively inexpensive</li> <li>o fits into almost all existing fixtures</li> </ul>	<ul style="list-style-type: none"> <li>o high maintenance</li> <li>o wattage to lumen output about 85% of high-pressure sodium (HPS)</li> <li>o Short (12,000 hour) rated life</li> <li>o some mercury content</li> </ul>
<b>HID* high pressure sodium (HPS)</b>	<ul style="list-style-type: none"> <li>o low maintenance</li> <li>o inexpensive</li> <li>o relatively efficient: highest output per energy input- "greenest" of existing lamps</li> <li>o fits into almost all existing fixtures</li> </ul>	<ul style="list-style-type: none"> <li>o yellowish light not pleasing to many</li> <li>o relatively poor color rendition</li> <li>o perception of high crime area</li> </ul>

\*HID: "high intensity discharge"

# Proposed Technology:

Light Source	Advantages	Disadvantages
<p><b>Induction</b></p>	<ul style="list-style-type: none"> <li>○ Long life: 100,000 hours rated life</li> <li>○ Reduced maintenance costs</li> <li>○ 40 – 60% energy savings over Mercury Vapor</li> <li>○ White light source, excellent color rendition (CRI 80) vs. high-pressure sodium (CRI 22) and metal halide (CRI 70)</li> <li>○ Significant reduction in mercury content over HID sources</li> <li>○ Proven technology used extensively in Europe and Asia.</li> </ul>	<ul style="list-style-type: none"> <li>○ Higher initial cost (can be over 3-times the cost of conventional HID lamps)</li> <li>○ Generally larger than HID lamps, making them most appropriate for installation in large fixtures such as decorative post tops. New sizes are coming onto the US market, however.</li> </ul>
<p><b>Light Emitting Diodes (LEDs)</b></p>	<ul style="list-style-type: none"> <li>○ Long life: Up to 100,000 hours estimated</li> <li>○ Reduced maintenance</li> <li>○ 30-60% claimed reduction in energy use over High Pressure Sodium</li> <li>○ Reduced “trespass” light</li> <li>○ Directional light control</li> <li>○ Increased uniformity</li> <li>○ No mercury</li> </ul>	<ul style="list-style-type: none"> <li>○ Higher initial cost (over 10-times the cost of conventional HID)</li> <li>○ Cannot be applied, installed, or retrofitted into all types of fixtures.</li> <li>○ Some applications want spill light (storefronts, etc.)</li> <li>○ Higher perceived brightness or “glare” to eye</li> <li>○ No standards of light output</li> </ul>

# Status of Products

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- ***Induction***
  - Cobra head product
  - Available 1-1-09
- ***LED***
  - Testing product viability



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# LED Issues

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- ***Regulatory and Product Standards***
  - IESNA
    - Measuring light output
    - Life of product
    - Energy savings
- ***Test Installation***
  - Ann Arbor
- ***Costs***



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# Induction Environmental Impacts

Existing Light	Annual CO2 Emissions	Replace with	Annual CO2 Emissions	CO2 Emissions Reduction per year
100 watt Mercury Vapor	497 lbs	40 watt Induction Fixture	181 lbs	316 lbs

## 145,000 Mercury Vapor Fixtures

- Annual Carbon Reduction = 30,375 tons/year
- Annual Energy Savings = 64,723,482 kWhr/year
- Mercury Removed = 8.9 lbs

Energy savings based on posted total energy consumption for mercury vapor units from PSE&G tariff (2006) against manufacturer posted total energy consumption.  
Carbon savings based on NJ CO2 emission rate of 0.905 lbs/kWhr, J. Hough, PSE&G.  
Mercury volumes are manufacturer claims per MSDS.



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