LED Street Lighting
Pilot Project Overview

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Street Light System Description

- CenterPoint Energy owns, operates and maintains approximately 385,000 street light within the company's 5,000 square mile service territory.

- The street light system is comprised of the following light types:
  - mercury vapor (3.9%)
  - high pressure sodium (94.7%)
  - metal halide(1.4%).

- The street light system is comprised of the following mounting configurations:
  - overhead (31%)
  - underground (69%)

- Decorative fixtures make-up approximately 5% of the CenterPoint Energy street lighting system.

LED Pilot Project 1

- CenterPoint Energy's Street Light Operations group and its Distribution Engineering Standards group began their formal investigation of LED street light technology in 2008.
- The Company initiated a pilot within the City of Missouri City in October 2008 with the installation of 10 BETA Edge fixtures.
- The fixtures, which replaced 100 watt high pressure sodium luminaires, performed well, however, results were inhibited by site conditions (tree canopy interference and pole spacing).

LED Pilot Project 2

- CenterPoint Energy was approached by the City of Houston in May 2009 requesting a study of LED street lighting and it's potential to reduce street light electric service billings, reduce energy consumption and improve area lighting.

- Both CenterPoint Energy and the City of Houston were approached by numerous LED street light vendors offering their products for evaluation.

- For Pilot Project 2 - Phase 1, initial vendor selection was limited to twelve manufacturers, each providing three "100 watt HPS equivalent" luminaires for installation and evaluation.

Pilot Project 2 Phase 1- Participants

- Intencity Lighting
- Synergy Micro Technologies
- Control Technologies
- Niland Company
- Hadco Lighting
- Beta LED Lighting
- LED Roadway Lighting
- American Electric Lighting
- Cyclone Lighting
- KIM Lighting
- Ecofit Lighting (retrofit)
- Greenworld LED Lighting

Well Designed vs. Substandard Designed LED Fixtures

Typical residential streets in the COH require Type II distribution to properly illuminate the roadway.

- Well designed LED fixtures provide :
  - Consistent horizontal light distribution along the roadway (uniformity)
  - Minimum lighting levels required for the roadway application
  - Controlled light output (focused on the road) with minimum back light
  - High lumens per watt delivery (efficacy)

- Substandard designed LED fixture shortcomings:
  - Light distribution along the roadway, light is not evenly spread
  - Minimum lighting levels are not achieved at various points along the light grid
  - Higher than recommended light levels are projected back of curb (wasted light)
  - Low lumens per watt delivery (poor efficacy) and efficiency

Evaluation Criteria

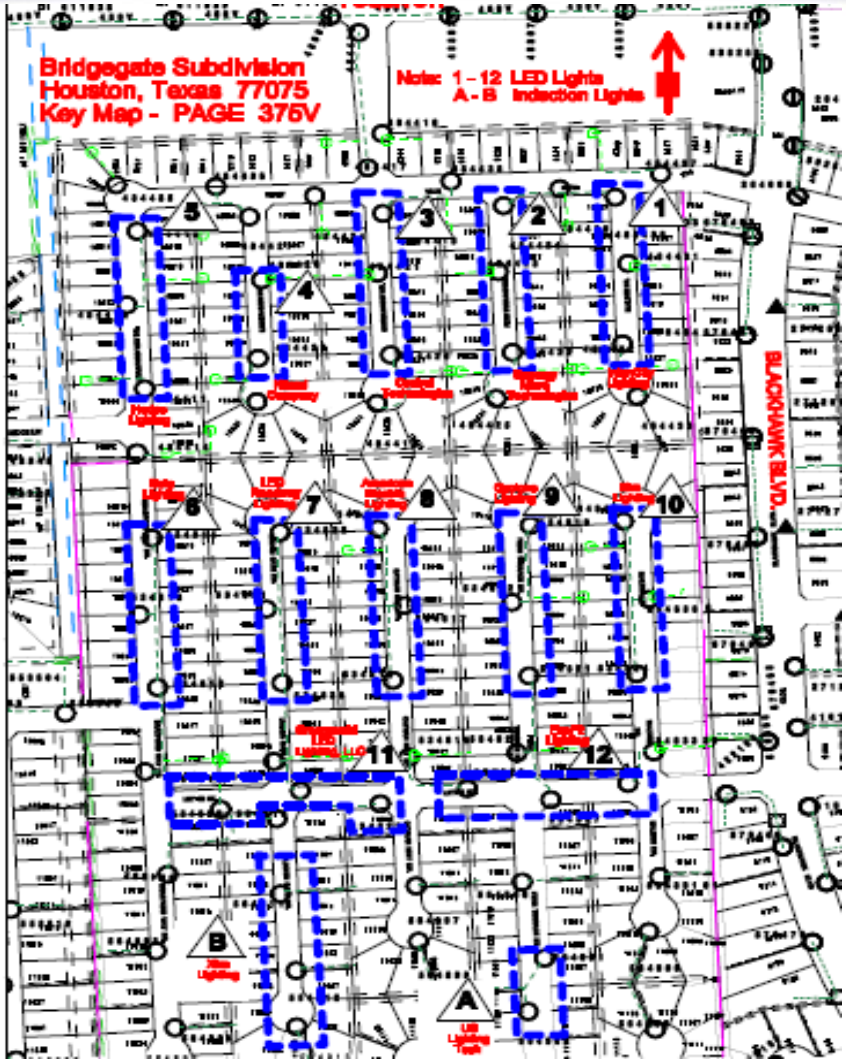
- Input Power (Watts)
- Input Current (Amps - Actual on-site measurement)
- Lumen Output
- Weight
- EPA Rating (Effective Projected Area)
- LED'S (Manufacturer and number used, type and size of driver, warranty on LED's, warranty on driver)
- Installation Concerns (As noted by field consultant and service technician during initial installation.)
- CRI (Color Rendering Index)
- IP66 Rated
- Photometric Files Available / LM-70 Data
- Color Correlated Temperature (Kelvin)
- Cost
- Arrestor Protection
- Junction Temperature
- Production Capacity
- External 3 prong photo receptacle

Pilot Project 2 Phase 1 – Site Selection

- Based on experience gained from the original LED pilot, a new site was selected which provided uniformity of pole spacing / pole height and no tree canopy interference.

- Each street contained three street lights, consequently, each manufacturer was assigned a specific location whereby their product could be independently evaluated.

Pilot Project 2 - Location Site Map



Pilot Project 2

- LED pilot street lights were installed in September 2009 and were to remain in the field for six months.

- Periodic output measurement evaluations were taken over the life of the installation.

- Based on performance relative to evaluation criteria, five manufacturers were selected from Phase 1 and asked to provide the latest version of the previously evaluated fixture for Phase 2 evaluation.

Project 2 – Phase 1 Select / Reject

- LED fixtures chosen were based on:
  - Little or no glare observed while standing on driving lane next to fixture
  - Perceived light levels and measured light levels (.3 foot candles or better)
  - No dark spots between poles & even distribution of light
  - Internal luminaire quick cable connect/disconnect
  - Consumption (input power & current)
  - Weight and handling capability (13 – 25 Lbs.)
  - Aesthetic compatibility with the cobra style pole
  - Cost

- LED fixtures not chosen were based on:
  - Excessive glare
  - Minimum measured light levels not achieved along the roadway
  - Hot spots under the pole and too much back light projected behind the pole
  - Special tools required to open fixture; installation was awkward and burdensome
  - Luminaire weight was excessive (> 25 Lbs.)
  - Luminaire was too decorative for cobra style pole application
  - Cost of fixture was 2 – 3 times targeted price

Pilot Project 2 Phase 2 - Participants

For Phase 2 of the project, seven new LED street light manufacturers have provided three “100 watt HPS equivalent” luminaires for installation and evaluation in the Phase 2 pilot project.

- Phillips Lumec
- General Electric
- Cooper Lighting
- Victor Lighting
- Sunovia Energy Technologies
- Lighting Science Group
- Manconix, Inc.

Project 2 - Observations

- Top rated LED fixtures provided a viable alternative to traditional HPS cobra fixtures.

- Citizen feedback was positive as many perceived a marked increase in visible light. However, consensus is necessary within the industry (i.e.: IES standards) concerning foot candle / lumen output requirements.

- Due to the rapid development of LED street lighting technology, CenterPoint Energy will continue its evaluation of LED street lighting products.

- Concurrent with the technical evaluation, CenterPoint Energy will develop LED tariff rate offerings.

Questions