Shedding Light on LED Street Lights

Tuesday, May 16, 2017
2:00—3:15 pm
Panelists

▪ Daryl Braithwaite, Public Works Director, City of Takoma Park
▪ Marty Sorrentino, Capital Projects Coordinator, City of St. Petersburg
▪ Leslie Darling, Executive Director, Chicago Infrastructure Trust
▪ Moderator, Crystal McDonald, US DOE
City of Takoma Park
Maryland

Takoma Park’s Streetlight Conversion Saga

Daryl Braithwaite, Director of Public Works
Takoma Park, Maryland

- 2.2 square miles
- DC suburb, established in 1883
- Community is a mix of historic homes, post-WWII homes and apartment buildings
- The streetlight mix includes incandescent and high pressure sodium, all mercury vapor fixtures replaced by the utility
Key Streetlight Account Details

- Electric utility – Pepco - owns the lights
- Annual costs include $158,000 in utility fees and $47,000 in electricity
- Monthly utility fees include a fixed charge and a maintenance charge:
  - $5.75 per light for incandescent
  - $5.47 - $6.67 for HPS
- The City purchases renewable electricity from a third party with a County-wide purchasing group
1,577 Streetlights

(53% 70 watt, 17% 100 watt)

Billing Inventory: 1,050 high pressure sodium, 211 incandescent, 70 LED, 128 Mercury Vapor
Conversion Options:

- Retrofit with the Utility
- Retrofit through a third party - Performance Contract model
- Purchase the streetlights directly
Option 1 - Retrofit with the Utility

- Utility added LED fixtures to State approved tariff in 2014
- Difficult to determine price per LED
  - Initial listed price - $2,300 per fixture
  - City did a small retrofit of 49 lights at a cost of $1,583 per fixture
  - Current price estimated to be $1,200 (1,577 lights = $1,900,000)
- Benefits of this option include simplicity, process managed by others
- Negatives of this option are the limited offerings of the utility and no ability to negotiate pricing.
- Possible rebate from the State of MD ($150 - $250 per fixture)
- Utility financing available – 16 year term, $7 per fixture monthly ($1,500 per light)
Option 2 - Performance Contract

- Performance companies approached City
- Project scope - $2,000,000 – 15 year payback
- Project Development Agreement ($55-$60K if project not pursued)
- Detailed engineering analysis / possible additional projects included
- 3rd party maintenance for 15 years, then - ?
- All costs for conversion to be covered by savings in utility charges
- Actual City expenditures would remain at current levels over the 15 year period
- Biggest weakness of this option – Year 16 and beyond
Option 3 - City Buy Out & Replace

- Master Sales Agreement – PSC Approved
- Conditions:
  - City pays for an audit of existing fixtures ($25 per light)
  - Purchase price for old fixtures $440 each
  - City to post surety bond to cover cost of light removal ($500/light)
  - The pole would remain the property of Pepco – the City would not be guaranteed our space on the pole
- City Responsibilities:
  - Select new lights and contractor – to be Pepco approved
  - Set up outage reporting center
  - Ongoing maintenance contractor to be Pepco approved
## Cost Comparison of Options

<table>
<thead>
<tr>
<th>OPTION</th>
<th>Annual Electricity Use</th>
<th>Annual Expense</th>
<th>20 YR Cumulative Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Conversion</td>
<td>382,800 kwh</td>
<td>$65,379</td>
<td>$3,199,980</td>
</tr>
<tr>
<td>Performance Contract</td>
<td>382,800 kwh</td>
<td>$205,206 Year 1 – 16</td>
<td>$3,670,375</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$118,457 Year 16 - 20</td>
<td></td>
</tr>
<tr>
<td>City Purchase</td>
<td>382,800 kwh</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Status Quo</td>
<td>765,599 kwh</td>
<td>$205,216</td>
<td>$4,104,320</td>
</tr>
</tbody>
</table>
Current Status

- City Council approved moving forward with Pepco
- Pepco agreed to inventory our existing lights:
  - Document location by gps coordinates
  - ID type of light and wattage
  - Evaluate performance (too dim, too bright)
  - Note obstructions
- Pepco soliciting bids for LED fixtures for our project, specifications to include <3,000 K, Dark Sky Compliant, dimmable (not currently Pepco’s specification)
- Conversion completion goal – By end of 2017
Working with Your Utility Company

Marty Sorrentino
Capital Projects Coordinator
City of St. Petersburg, FL
Shedding Light on LED Street Lights
St. Petersburg, FL

• Urban Growth Stage
  • 500 People/Day moving to Florida
  • New Construction
  • Investor-Owned (I/O) Utility located in Downtown St. Pete
  • Tampa Bay Rays – Tropicana Field
  • Indy Car Race

• Office of Sustainability
  • Established 2015/2016
  • Star Communities
  • Sustainability Summit – April 4, 2017
    • Local climate, marine and environmental scientists
    • Extreme weather, local flooding, sea level rise and Tampa Bay Estuary
City’s SL Summary

30,500 Leased Lights with I/O Utility:
- High Pressure Sodium
- Metal Halide
- 28,500 closer to cobra head family
- 2,000 decorative SL
- Non-metered

- Over 1,900 City-owned SL
  - Decorative
  - Collector’s application
  - Metered
LED SL Initiative with I/O Utility

• LS-1 Rate Tariff
  • Rental, Maintenance and Energy Component of Rate
  • $4.8 million Annual Expenditures

• Challenges
  • No First Cost Funding
  • Business and/or Residential Community Perspective
  • AMA Community Guidance
  • Higher Maintenance Costs

• $240,000 Savings Annually
• No Out-of-Pocket Costs from City
• Starting with major thorough fares
• 3K vs 4K pilot project
First Phase of LED SL Project with I/O Utility
FDOT Signalized Intersection Project

• Upgrading SL at 2,500 Intersections in Florida
  • Intersections based on pedestrian crash reports
  • 50 intersections in St. Pete
  • Specified 4K LED street lighting
  • Homeless population in St. Pete

• FDOT & I/O Utility Partnership

• Good timing!
3K vs 4K

• 3000 Kelvin Color Temperature
  • Less blue light than 4K
  • Lower CRI than 4K
  • Less efficient light than 4K

• 4000 Kelvin Color Temperature
  • More blue light than 3K
  • Higher CRI than 4K
  • More efficient light source than 3K

• Takeaways
  • Relationship between CRI and CT
  • LED Optics
  • LED fixture design
3K vs 4K Cont.

- Neither new nor restricted to LED
- New Tennis Court Lighting – 400-watt 4K LED
- Old Tennis Court Lighting – 1,500-watt metal halide
3K vs 4K Cont.
Open Discussion Q & A?
City-wide Infrastructure Upgrades
Leslie Darling
Executive Director
Chicago Infrastructure Trust
Chicago’s Existing Outdoor Lighting

• 338,788 total light fixtures (City and Parks), largest in U.S.
• 92% High Pressure Sodium fixtures (yellow/orange 360° light; consume 50-75% more electricity than LED)
• >75% cobra head fixtures
• >60% “legacy” infrastructure; poles and wiring more than 15 years old, most 50+ years old
• Lighting is top reason for calls to non-emergency 311 system
• Electricity rates rising
• Full replacement of system=$2B
Street lighting is a solvable puzzle.
## Procurement Process

### Smart Lighting Procurement Timeline

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
<th>Year</th>
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<tbody>
<tr>
<td>Request for Information Issued (41 Responses)</td>
<td>December 2015</td>
<td></td>
</tr>
<tr>
<td>Request for Qualifications/Proposals Issued (30 Responses)</td>
<td>April 2016</td>
<td></td>
</tr>
<tr>
<td>Qualified Shortlist Selected to Respond to RFP (9 Teams)</td>
<td>July 2016</td>
<td></td>
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<tr>
<td>Request for Proposal Issued</td>
<td>November 2016</td>
<td></td>
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<tr>
<td>RFP Responses Due</td>
<td>January 2017</td>
<td></td>
</tr>
<tr>
<td>City Council Smart Lighting Project Ordinance Introduced</td>
<td>March 2017</td>
<td></td>
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<tr>
<td>Smart Lighting Project Passed by Chicago City Council</td>
<td>April 2017</td>
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<tr>
<td>Contract Execution (anticipated)</td>
<td>May 2017</td>
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Multi-Phase Procurement Process

Overview:

- RFP Part I designed to identify a shortlist of highly qualified teams with extensive experience
- Industry Review Period creates platform for iterative refinements of project scope utilizing private sector innovation and expertise
- RFP Part II shortlist structure drives competition throughout procurement

Two-Phase RFP Encourages:

- Biddable and Bankable Project Scope
  - Iterative process provides for industry input to optimize structure to meet project goals
- Higher Quality Proposals
  - Higher probability of winning & well-defined structure / scope encourages bidders to invest more time and resources in bid development
- Contractual & Procurement Schedule Certainty
  - Eliminates need for single-party negotiation, thereby ensuring contractual terms and procurement schedule
Project Description

1) Large-Scale LED Conversion
- 278,000 HPS cobra head, coach & viaduct lights converted to energy-efficient LED.
- Achieve at least 60% reduction in streetlighting electricity consumption.
- $10 million+ in annual utility cost savings.
- High quality fixtures with enhanced features: full cut-off, dimmable drivers

2) Targeted Infrastructure Stabilization Repairs
- Increases reliability & extends useful life of existing streetlight infrastructure.
- Up to $30+ million in targeted repairs to deteriorated wiring and light poles.
- Prioritized based on results of a city-wide asset condition assessment.

3) Lighting Management System ("LMS")
- Wireless mesh network and software enables remote monitoring & control.
- Enhances City’s ability to address streetlight outages & shorten response times.
- Automatically creates 311 outage ticket, reducing reliance on resident reporting.
- Provides platform for future “smart city” technology.
Neighborhood LED Demonstrations

- Seven public demonstrations of LED lighting located throughout the city
- Survey for residents to submit feedback
- Learnings for stakeholder team
  - Glare
  - Wattage
  - Light trespass
  - Light dispersion
- Opportunity to refine light specification
Chicago’s New Lighting

- Different fixtures for various lighting contexts (e.g., type of street, alley, etc.).
  - Delivering light where needed (street & side walk)
  - Limiting trespass in yards and homes


- Specifications follow latest nighttime guidance issued by American Medical Association & environmental advocacy groups:
  - Color Temperature: 3000K or less
  - Fully shielded, zero up-light
  - Dimmable lights
Project Keys

- Strong Project Champions
  - Mayor Emanuel
  - Chicago Infrastructure Trust
  - Partner Buy-In

- Careful Pre-Procurement Planning
  - Due Diligence
  - Scoping

- Thoughtful Procurement Process
  - Bandwidth of the CIT
  - Iterative
  - Transparent
  - Flexible
Your city can solve this puzzle, too.
Leslie Darling  
Executive Director  
Chicago Infrastructure Trust

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www.chicagoinfrastructure.org
In 2014 the Department of Energy established the Better Buildings Outdoor Lighting Accelerator (OLA) as a means of providing technical assistance to municipalities and other public agencies, in order to overcome the particular set of barriers each faced in upgrading their street lights to modern, high-performance systems. Partners included states, cities, and regional energy networks that have upgraded street lighting systems or at minimum assessed the feasibility of a conversion project.

The goal of the OLA was to work collaboratively with partners and other stakeholders to mitigate or remove technical, financial, and regulatory or utility tariff barriers to broad scale deployment of the preferred high performance technology using light emitting diode (LED) street lighting systems and controls. Numerous municipalities have already converted and their results are bearing out the technology’s claimed advantages. However, while many others are similarly interested, a variety of barriers impede their moving forward. A compendium of tools and resources to help municipalities with street lighting conversion planning and implementation can be found in the OLA Toolkit.

The OLA concluded in December 2016, and these partner profiles briefly describe conversion experience and reports on the progress of these efforts to date. A summary of the OLA Accomplishments describe what partners were able to achieve during the OLA period and a more detailed assessment of barriers have been captured in The Outdoor Lighting Accelerator: Lighting the Way Forward.
Thank You

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