LED Street Lights: Unprecedented Energy & Cost Savings

Nov. 15, 2016
Agenda

• George Woodbury, LightSmart Consulting
  – Successful Municipal Strategies
  – Optimizing Your Savings and Project Success
• Jen Metzger, Citizens for Local Power
  – Utility and legislative landscape for LED streetlights
• Nina Orville, Abundant Efficiency
  – Finance strategies
• Pat Courtney Strong, Courtney Strong, Inc.
  – How Can MHSC and Clean Energy Communities Help Your Municipality?
Successful Municipal Strategies

Optimizing Your Savings and Project Success
Who should own the lights
What is the benefit of conversion to LED
Benefits of collaboration
# Municipal Ownership

<table>
<thead>
<tr>
<th></th>
<th>Annual Fixture + Energy Charges CHG&amp;E</th>
<th>Annual Fixture + Energy Charges LED CHG&amp;E Program</th>
<th>Annual Fixture + Energy Charges LED Customer Owned</th>
</tr>
</thead>
<tbody>
<tr>
<td>70w High-pressure Sodium</td>
<td>$188.64</td>
<td>$158.12</td>
<td>$7.54</td>
</tr>
<tr>
<td>Annual Maintenance + Attachment fees</td>
<td>Included above</td>
<td>Included above</td>
<td>$6 + $6.96</td>
</tr>
<tr>
<td>Total</td>
<td>$188.64</td>
<td>$158.12</td>
<td>$20.51</td>
</tr>
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</table>

Savings 81% vs 16.2%
Greater Control
Future Opportunities
# Municipal Ownership

<table>
<thead>
<tr>
<th></th>
<th>Annual Fixture + Energy Charges NGRID</th>
<th>Annual Fixture + Energy Charges 30w LED NGRID Program</th>
<th>Annual Fixture + Energy Charges 22w LED Customer Owned</th>
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<tr>
<td>70w High-pressure Sodium</td>
<td>$92.39</td>
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<td>$8.93</td>
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<td>Annual Maintenance + Attachment Fees</td>
<td>Included above</td>
<td>Included above</td>
<td>$6 + $7.20</td>
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<tr>
<td>Total</td>
<td>$92.39</td>
<td>$94.55</td>
<td>$22.14</td>
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</table>

Savings 79% vs -2.33%
Greater Control
Future Opportunities
LED Technology

• Reduced Energy Consumption 60%-70%
• Improved Lighting and Safety
• Improved Reliability
  – HID System average 18% service rate/year
  – LED System average .5% to .8% service rate/year
• Future Applications-Control Technology
## Opportunity Costs

<table>
<thead>
<tr>
<th></th>
<th>Annual Fixture + Energy Charges CHG&amp;E</th>
<th>Annual Fixture + Energy Charges 70w HPS Customer Owned</th>
<th>Annual Fixture Charges + Energy 22w LED Customer Owned</th>
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<tr>
<td>70w High-pressure Sodium</td>
<td>$188.64</td>
<td>$30.75</td>
<td>$7.54</td>
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<tr>
<td>Annual Maintenance + Attachment fees</td>
<td>Included above</td>
<td>$24 + $6.96</td>
<td>$6 + 6.96</td>
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<tr>
<td>Total</td>
<td>$188.64</td>
<td>$61.71</td>
<td>$20.51</td>
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<tr>
<td>Savings</td>
<td>$128.93</td>
<td></td>
<td>$168.13</td>
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<tr>
<td>1 Yr. Opportunity Costs</td>
<td></td>
<td></td>
<td>$39.20</td>
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Assume 15% savings on energy and fixture costs
- Fixture Costs-$125 x 15% = $18.75
- Energy Savings 22w x 15% = 3.3w x 4k Hrs x $.08575 = $1.13
- Increased Cost of Labor (CPI 2.5%) $85 x .025 = 2.13
- Net value saved by waiting $17.75
- Interest rates?
Benefits of Collaboration

• Purchasing Power
  – PRISM-Program for Rhode Island Streetlight Management

<table>
<thead>
<tr>
<th></th>
<th>Town Price</th>
<th>PRISM Price</th>
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<tbody>
<tr>
<td>Street Light Repair</td>
<td>$94</td>
<td>$69.99</td>
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<tr>
<td>42 Watt LED</td>
<td>$142.01</td>
<td>$121.05</td>
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</table>

• Staff Time
• Expert Representation at PSC and Your Utility
• Loyalty to Members
## Two Case Studies - CHG&E

<table>
<thead>
<tr>
<th></th>
<th>Kingston (2421 Lts)</th>
<th>Ulster (350 Lts)</th>
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<tbody>
<tr>
<td><strong>Current Costs (July 2016 Tariff)</strong></td>
<td>$514,025</td>
<td>$91,745</td>
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<tr>
<td><strong>Converted to LED Customer Owned Costs</strong></td>
<td>$153,091</td>
<td>$28,343</td>
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<tr>
<td><strong>Savings</strong></td>
<td>$360,934</td>
<td>$63,402</td>
</tr>
<tr>
<td><strong>Estimated Purchase Price</strong></td>
<td>$469,638</td>
<td>$81,900</td>
</tr>
<tr>
<td><strong>Estimated Project costs</strong></td>
<td>$659,843</td>
<td>$112,392</td>
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<tr>
<td><strong>ROI</strong></td>
<td>3.2 yrs.</td>
<td>3.1 yrs.</td>
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</table>

* Does not include contingency for equipment repair
CHALLENGES

- Lack of Consistency in Utility LED Filings
- Imposition of Unreasonable Requirements and Fees on Customer Owned Lights
- No Provision for Control Technology and IOT
George A. Woodbury  
george.woodbury@lightsmartconsulting.com  
President  
Cell 603-321-0212
The Opportunity

LED streetlights can reduce energy use by as much as 65%.

If just 20 NYS municipalities converted to LEDs, energy consumption would be reduced by nearly 80 million kWh over a 15-year period. This translates to a cost savings of $6.5 million.
Outside of New York City, about 74% of street lights in the state are utility-owned. Local governments pay a rental charge for each fixture, plus an electricity supply charge.

Two possible pathways to LED streetlight conversion:

1. Upgrade to utility LEDs, where available. Only Orange & Rockland and Central Hudson offer LEDs at this time.
2. Purchase streetlight system from the utility, and convert to LEDs. 2015 NYS legislation has made this easier.
Orange & Rockland Proposed LED Streetlights Are Over-Sized

<table>
<thead>
<tr>
<th>Existing fixture</th>
<th>Optimal LED replacement</th>
<th>Utility replacement</th>
<th>Over-sizing of LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>70w HPS</td>
<td>25w</td>
<td>50w</td>
<td>100%</td>
</tr>
<tr>
<td>100w MV</td>
<td>15w-25w*</td>
<td>35w</td>
<td>133%-100%</td>
</tr>
<tr>
<td>150w HPS</td>
<td>53w</td>
<td>103w</td>
<td>94%</td>
</tr>
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</table>
# Cost of O&R Proposed LED Replacements (examples)

<table>
<thead>
<tr>
<th>Existing Fixture</th>
<th>Total annual est. costs (rent, supply &amp; other charges)</th>
<th>Utility LED replacement</th>
<th>Total annual est. costs (rent, supply &amp; other charges)</th>
<th>Annual est. bill impact (add. cost per light)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70w HPS</td>
<td>$199.26</td>
<td>50w LED</td>
<td>$229.02</td>
<td>+$29.26</td>
</tr>
<tr>
<td>100w MV</td>
<td>$187.34</td>
<td>35w LED</td>
<td>$217.78</td>
<td>+$30.44</td>
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<tr>
<td>150w HPS</td>
<td>$275.03</td>
<td>103w LED</td>
<td>$296.01</td>
<td>+20.98</td>
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</table>
O&R Tariff Weaknesses

- LED lights are over-sized (wattage-wise), reducing energy & financial savings.
- Fixture charges are higher for LEDs.
- Will upgrade in course of routine maintenance; to accelerate conversion munis would have to pay stranded costs of existing lights ($134 per light), + materials & labor costs of installation.
- MHSC has filed comments with PSC calling for major revisions to the tariff proposal. Final tariff due Feb. 2017.
Central Hudson LED Streetlights are Over-Sized

<table>
<thead>
<tr>
<th>Existing fixtures</th>
<th>Optimal LED replacement</th>
<th>Utility LED replacement</th>
<th>Over-sizing of LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>70w HPS</td>
<td>25w</td>
<td>39w</td>
<td>56%</td>
</tr>
<tr>
<td>100w MV</td>
<td>15w-25w*</td>
<td>39w</td>
<td>160%-56%</td>
</tr>
<tr>
<td>150w HPS</td>
<td>53w</td>
<td>82w</td>
<td>55%</td>
</tr>
</tbody>
</table>
## Costs of Central Hudson LED replacements (examples)

<table>
<thead>
<tr>
<th>Existing Fixture</th>
<th>Total est. 2016 costs: (rent, supply &amp; other charges)</th>
<th>Utility LED replacement</th>
<th>Total est. 2016 costs: (rent, supply &amp; other charges)</th>
<th>Annual est. bill impact (reduced cost per light)</th>
</tr>
</thead>
<tbody>
<tr>
<td>70w HPS</td>
<td>191.36</td>
<td>39w LED</td>
<td>159.35</td>
<td>-$32.01</td>
</tr>
<tr>
<td>100w MV</td>
<td>208.85</td>
<td>39w LED</td>
<td>159.35</td>
<td>-$49.50</td>
</tr>
<tr>
<td>150w HPS</td>
<td>240.21</td>
<td>82w LED</td>
<td>192.04</td>
<td>-$48.17</td>
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</table>
Compared to the O&R Tariff

- Fixture charges are in most cases lower than lights being replaced.
- Like O&R options, over-sizing of wattage = reduced energy & financial savings.
- Municipalities will see savings as a result of lower rates and less energy consumed.
- Will upgrade in the course of routine maintenance; to accelerate, munis must pay stranded costs of $117 per light. Can amortize over 5 yrs. & pay through savings.
New York State Electric & Gas (NYSEG)

- Currently offers no LED option.

- Proposed LED options in 2015 that were rejected by Dept. of Public Service Staff due to high cost, inflated expenses, and inadequate research into fixture choices.

- Required by NYS PSC to file a new proposal for LED options by Dec. 15, 2016.
Findings of a 2008 NYS Comptroller streetlight report on streetlight costs:

Five towns studied would save $13 million in streetlight costs over the term of 20-year bonds.

Local governments in Massachusetts: Achieving 70% savings by purchasing their streetlights and converting to LEDs.

( Metropolitan Area Planning Council for the Boston, MA region)

"We consider the purchase of municipal street lighting systems to be a winning proposition....Each municipality should review available information and make an informed, educated decision as to whether this is the appropriate course of action.”

— NYS Comptroller
Biggest cost of utility ownership model:
Rent for fixtures, not energy delivery.

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</thead>
<tbody>
<tr>
<td>70w HPS, company-owned</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Annual fixture charge</td>
<td>$163.31</td>
<td>$89.16</td>
<td>$168.84</td>
</tr>
<tr>
<td>70w fixture, customer-owned</td>
<td>$24.65</td>
<td>$9.44</td>
<td>$20.28</td>
</tr>
<tr>
<td>Delivery charge</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Purchase of Streetlight System Made Easier

- **Oct. 2015:** Public Service Law establishes procedures for transfer of ownership.

- **Nov. 1, 2016:** Utilities file amended tariffs complying with new law, setting out process & requirements.

- Purchase is negotiated between the utility & municipality, & must comply with new tariff requirements. Munis can petition PSC for purchase if utilities do not move purchase process forward.

- Recently purchasers of street light systems: Cities of Beacon, Kingston and Poughkeepsie (Central Hudson service territory) & the Towns of Clarkstown & Orangeburg (O&R territory).
MHSC wins tariff changes benefiting municipalities!

In direct response to MHSC comments, the PSC made several important rulings in its Order on new tariff procedures for street light system purchase:

- To increase transparency in purchase negotiations, utilities must provide munis with all data behind cost estimates.

- Utilities are prohibited from making municipalities pay for a field audit of utility lights as a condition of the purchase.

- Utilities cannot charge the municipality for utility of municipal light installation work.
The Street Light Transfer Process

- Municipality requests estimated purchase price. Utility has 90 days to respond.

- Municipality must notify utility within 180 days if it wants to move forward. (Price remains negotiable.)

- Negotiations commence.

- Upon signed agreement utility files with PSC. Approval can take up to three months for sale <1,000 streetlights, 4-6 months for sale >1,000 streetlights.
Upgrading to LED streetlights promises substantial economic, environmental, and community benefits.

Municipalities renting lights from their utility have two possible options:
1. Upgrading to utility LEDs, if available
2. Purchasing their streetlights and converting to LEDs.

Utility LED options are limited, though will improve over time.

Municipal ownership model is a promising alternative.
Thank you!

Jennifer Metzger
Director, Citizens for Local Power

jenmetzger@gmail.com
Financing Overview

Financing/implementation options include:

- Municipal Debt
- Self-Funding
- Energy Performance Contract
- New York Power Authority Energy Services Contract
- Municipal Leasing
- Additional Third-Party Options

Cost to acquire existing lights (if necessary) may be bundled into above financing approaches or funded separately by the municipality.
Municipal Debt

Municipal debt in form of bonds or short-term Bond Anticipation Notes (BANs). Considerations/Characteristics include:

- May be lowest cost
- Bundle with other financing needs
- Impacts borrowing capacity and debt rating
- Project payback period may determine whether use of BANs or longer-term bonds or is appropriate.
Municipal Finance Example: Kingston

City of Kingston. October 2015, Common Council authorized bonding $2.1 million for acquisition of 2,000+ utility-owned streetlights and conversion of those plus 400+ city-owned lights to LED. PSC currently reviewing the proposed acquisition and LED conversion procurement process is underway.
Municipal Finance Example: Dobbs Ferry

Village of Dobbs Ferry. Effected conversion in two phases:
2011 – First significant LED installation in Westchester. Cost of $100K+ for 300 LED lights financed via Bond Anticipation Note. Installation by DPW. 3-year payback was shorter than term of financing.
2016 - $167K Project cost financed with capital funds ($85K balance from first LED conversion) and bond anticipation note. Project included furnishing and installation of 400 lights by vendor.
Self-Funding

Municipalities may self-fund streetlight conversion using capital funds and/or operational funds (plus anticipated or accrued savings). Considerations include:

- Likely to result in incremental conversion with loss of economies of scale of larger project as well as opportunity to capture full conversion savings quickly.
- Many municipalities don’t have sufficient budget flexibility to accommodate this use.
- Start with higher wattage lights to capture more savings.

New York City has largely used this approach in its LED conversion, allocating savings from early phases of project to additional conversion.
Energy Performance Contract

Energy performance contracts (EPCs) enable projects to be financed through energy savings. Regulated through New York State Energy Law Article 9. Key characteristics:

- Turnkey Service – Investment-grade energy audit, implementation and M&V by ESCO.
- Project Financing – ESCO may arrange/provide project financing (often in form of a lease).
- Portfolio Approach - Multiple projects may be bundled in single EPC.
- Guaranteed Savings – ESCO provides guaranteed savings (at minimum, sufficient to cost of the project).
- May not be available for very small projects.
EPC Example: City of Yonkers

- 12,000 lights.
- RFP issued in 2012 for energy performance contract (audit, procurement, installation).
- $8.7 million project cost repaid through 10-year lease from energy savings.
- Net savings almost $1 million/year.
- Municipal GHG reduced by 10%
EPC Example: Town of Mamaroneck

• 20-year $7.35 million EPC for portfolio of projects (boiler upgrades, ice rink improvements, building envelope measures and a generator upgrade, in addition to streetlights and other measures).*

• Savings generated through the streetlight replacements – largest source of combined energy and operational savings - help fund other project components.

• Town financed the EPC through bonding, rather than securing funding through the ESCO.

* Town of Mamaroneck Honeywell Agreement.
New York Power Authority

NYPA services include energy efficiency and renewable energy projects as well as energy audits and feasibility studies. NYPA support for streetlight conversion includes:

- Turnkey service – procurement and project management services (optional lighting design services also available) with oversight by NYPA
- Low-cost fixed-rate financing in form of general obligation loans or tax-exempt municipal leases.
- Financing also available for purchase of existing lights.
NYPA Example: Town of Clarkstown

Clarkstown negotiated the purchase of its 3,880 streetlights from Orange and Rockland Utilities for $670,000. In September 2016, the Town entered into agreement with NYPA to manage conversion of streetlights to LED. Total savings from town-ownership and LED conversion are expected to be over $900K annually.
Tax-Exempt Municipal Lease

Key characteristics include:

- Can be structured to be off-balance sheet.
- Energy cost savings gained through LED conversion exceed municipal lease payments.
- At the end of the contract term, the municipality owns the installed equipment.
- Can include acquisition of existing lights.

Tax-exempt municipal leases are familiar as an equipment finance tool, and can also be used for streetlight financing -- an option that should be considered.
Other Third-Party Ownership Models

New entrants in the financing of energy projects, including streetlight conversions. New York Green Bank partnering with companies offering project implementation and financing for energy improvement projects using innovative approaches. Characteristics may include:

- Turnkey solutions, including project design, implementation, maintenance, measurement and verification.
- Energy service agreement rather than lease or loan. Payments based on energy saved.
- Financing is available off-balance sheet.
Financing Considerations

Assess options for best fit. Considerations include:

- Cost of financing
- Municipal borrowing capacity
- Project management capacity
- Benefits vs. higher cost of performance guarantee

Collaborative procurement efforts reduce project costs (and the amount that must be financed to effect conversion) and may improve the terms and expand the range of financing options available.
Thank You!

Nina Orville
Abundant Efficiency

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914-693-6222
MHSC helps communities:

- Understand benefits of LED streetlight conversion
- Assess which pathway to LED conversion (utility or municipal ownership) is right for specific municipalities
- Provide design and technical support
- Facilitate cost-effective upgrades
MHSC Service Area

• Lower and Upper Hudson Valley villages, towns and cities served by:
  – Central Hudson Gas & Electric
  – Orange & Rockland Utilities
  – NYSEG

Counties served: Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster and Westchester and those parts of Columbia and Greene counties served by any of above utilities.
Initial steps / MHSC

- Municipal Survey
- Invite Consortium members/Kick off
- Convene steering committee
- Facilitate municipal streetlight inventories
- Develop/disseminate Options Study
MHSC steps, continued

- Develop/disseminate RFPs
- Assist municipalities w/RFP response review
- Administer joint procurement of LED fixtures
- Ongoing: e-newsletter, webinars, workshops
- Information to be shared statewide
Consortium Costs

• No cost to join and participate

• No cost: Options Report, Procurement RFP and all other products developed by MHSC
Consortium Benefits

• Access to expert advice/decision support
  – Optimal streetlight design
  – Financial options
  – Technical considerations
  – Maintenance planning
Street Light Assistance Across NYS

NYSERDA *Clean Energy* Communities:
LED Street Lights as
‘High Impact Action’

= Financial Incentives for Municipalities
Initial steps / CEC

Demonstrate completion of LED Street Lights by submitting documentation (also see www.nyserda.ny.gov/cec):

- Minimum of 50% of municipal and utility-owned cobra-head-style street lights converted to LED within the geographic jurisdiction.
- Include # street lights converted + proportion of converted cobra-head lights to total cobra-head street lights
- Minimum of 10 fixtures must be converted to qualify.
<table>
<thead>
<tr>
<th>Name</th>
<th>Organization</th>
<th>Phone Number</th>
<th>Email Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daniel Sullivan</td>
<td>Mohawk Valley Economic Development District</td>
<td>315-866-4671</td>
<td><a href="mailto:dsullivan@mvedd.org">dsullivan@mvedd.org</a></td>
</tr>
<tr>
<td>Carla Castillo</td>
<td>Hudson Valley Regional Council</td>
<td>(845) 564-4075</td>
<td><a href="mailto:ccastillo@hudsonvalleyrc.org">ccastillo@hudsonvalleyrc.org</a></td>
</tr>
<tr>
<td>Jamie Rogers</td>
<td>Adirondack North Country Association</td>
<td>(518) 891-6200</td>
<td><a href="mailto:jrogers@adirondack.org">jrogers@adirondack.org</a></td>
</tr>
<tr>
<td>Robyn Reynolds</td>
<td>Capital District Regional Planning Commission</td>
<td>(518) 453-0854</td>
<td><a href="mailto:robyn@cdrpc.org">robyn@cdrpc.org</a></td>
</tr>
<tr>
<td>Chris Carrick</td>
<td>Central New York Regional Planning and Development Board</td>
<td>(315) 422-8276 x213</td>
<td><a href="mailto:ccarrick@cnyrpdb.org">ccarrick@cnyrpdb.org</a></td>
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How to get started

Call or email us:

pat@courtneystrong.com
845/331-2238