

CITY OF MARKHAM

**PRESENTATION TO GENERAL COMMITTEE
LED STREETLIGHTING - STATUS UPDATE
MARCH 18, 2013**

AGENDA

1. Phase I/Phase II Tasks
2. Procurement Process
3. Evaluation of RFPQ
4. Pre-Qualified LED Manufacturers and Qualified Products
5. Funding Sources
6. Payback Calculations / Expected Savings
7. Incentive Programs
8. Dimming Systems
9. Feasibility of Dimming for Markham Streets
10. Dimming Options
 - a) Part-Night Dimming
 - b) Part-Night & Constant Light Output (CLO) Dimming
 - c) Payback Calculations
11. Monitoring, Metering & Dimming Systems
 - a) Monitoring, Metering & Part-Night + CLO Dimming
 - b) Payback Calculations
 - c) Business Case Evaluation
12. Next Steps
13. Recommendations

Phase I/Phase II Tasks

- ▣ Survey the current state of LED lighting technology
- ▣ Survey current local pilot programs
- ▣ Develop performance & technical standards
- ▣ Survey market for compliant products
- ▣ Perform life cycle analysis
- ▣ Develop business case to convert 12,735 of cobra head fixtures to LED (Total inventory - 24,475)
- ▣ Pre-qualify LED Manufacturers and LED products
- ▣ Field testing of pre-qualified products
- ▣ Obtain Council's approval to implement

Procurement Process

- ▣ Pre-qualify LED manufacturers and replacement fixtures through the RFPQ process (**completed**)
- ▣ Pre-qualify installation contractors through RFPQ process (**In progress**)
- ▣ Issue a RFP for supply and installation utilizing the pre-qualified LED manufacturers products (**April 2013**)
- ▣ Award contract(s) to supply and install (**May 2013**)

Request for Pre-Qualification (RFPQ) LED Manufacturers

- ▣ RFPQ 176-P-12 Advertised on July 11, 2012
- ▣ Specifications and Bid Criteria included
 - ▣ Photometric Performance
 - ▣ Unit Pricing of luminaire
 - ▣ Specification conformity
- ▣ Acceptance Criteria Established; 75 Points Minimum

Primary Evaluation of RFPQ

- ▣ Responses back from Seven Proponents
 - ▣ Philips, Cree, LED Roadway Lighting (LRL), Acuity, Cooper Lighting, Osram/Sylvania, and GE (Tymat)
- ▣ Only Four Proponents met Acceptance Criteria
 - ▣ Philips, LRL, Cooper, and GE (Tymat)
- ▣ Financial assessment process was completed to provide the City with a degree of assurance that the Proponents can meet commitments under the contract as per the Supplier Pre-qualification Policy

Field Testing of Product Samples

- ▣ **Results from Field Verification**
 - Local Residential Streets (representing 70% of installed Base). **Green Lane**
 - Philips Roadstar: GPLS-40W30LED4K-ES-LE2 (**Passed**)
 - LRL: SAT-24S-525-T2 (**Passed**)
 - Cooper: OVHB02LEDEUSL2 (**Failed**)
 - Collector Streets with Low Pedestrian Conflict, **16th Ave.**
 - Philips Roadview: RVS-135W80LED4K-LE2 (**Passed**)
 - Collector Streets with Medium Pedestrian Conflict, **Hwy 7**
 - GE: ERS 40SSEX5402GRAYL (**Passed**)

Pre-Qualified LED Manufacturers

- ▣ Final List of Pre-Qualified Manufacturers;
 - Philips Lumec
 - LED Roadway Lighting (LRL)
 - GE (Tymat)
- ▣ Qualified Products were selected based on:
 - Meeting lighting design criteria
 - Meeting mechanical & electrical requirements
 - Reasonable Payback period

FUNDING SOURCES

- ▣ Capital cost: \$7,632,000
- ▣ Payback calculations provided to support the Business Case
- ▣ The 'Streetlights - LED Conversion of Cobra-head fixtures' project was approved as part of the 2013 Capital Budget with the following funding sources:
 - Life Cycle Replacement and Capital Reserve- \$6,627,800*
 - Gas Tax- \$1,004,200

* Funded from the Life Cycle Replacement and Capital Reserve to be repaid through Operating Savings

Payback Assumptions

Capital Costs:

- ▣ Total HPS Cobra Head Luminaires to be replaced; 12,735 (GIS Data August 2012)
- ▣ Capital cost is based on lowest wattage fixtures and estimated installation cost;
- ▣ Average energy cost of \$0.119 kWh

Expected Savings:

- ▣ Existing Connected Load;
 - ▣ 2,385.4 kW
- ▣ New Connected Load using lowest wattage fixtures;
 - ▣ 943.8 kW
- ▣ Reduction in Connected Load;
 - ▣ 1,441.6 kW (60.4%)

Expected Savings (per annum)

Operating Accounts	Estimated Annual Cost for 12,735 fixtures	Expected Savings from LED Conversion for 2014*
Streetlight Hydro	\$ 1,243,313	\$ 753,000
Streetlight Maintenance & Repair	\$ 299,972	\$ 171,000
Total	\$ 1,543,285	\$ 924,000

PAYBACK CALCULATION

- ▣ The Payback is 8.3 years based on capital cost of \$7,632,000 and annual operating savings of \$924,000 ($\$7,632,000 / \$924,000$)
- ▣ Implementation will be completed by end of 2013 and operating savings will be realized in 2014
- ▣ Every year \$924,000 of expected operating savings will be used to fund the capital project

Incentive Programs

Opportunity to obtain incentive rebate from
SaveONenergy Retrofit Program based on energy
savings;

\$315,000

Reduced Payback Period = $(\frac{\$7,632,000 - \$315,000}{\$924,000})$

7.9 Years

Available Types of Dimming Systems

- ▣ Factory installed; non-addressable
 - Time-of-Night dimmers
 - Constant Light Output dimmers (CLO)
- ▣ Factory installed; wireless addressable
 - As above but could also be incorporated with monitoring and metering, and allow adjustment to dimming protocol
- ▣ All LED Luminaires utilizing dimming controllers will require upgrade to dimmable drivers

Feasibility of Dimming for Markham Streets

- ▣ Dimming is applicable only when Pedestrian Activity is reduced during the night
 - Streets already identified as having low pedestrian activity cannot be further reduced
 - Of the 12,735 cobra head luminaires, 8,991 are installed in low pedestrian conflict areas.
- ▣ 3,744 higher wattage cobra heads are installed where pedestrian activity is medium
 - Usually programmed for 5 hours per night (Midnight to 5:00 AM)
- ▣ Should be written into a By-law

Dimming Option

Factory Installed, Non-Addressable

Estimated Incremental Cost:

- ▣ Additional Cost for luminaire components (over base fixture); \$175
- ▣ Total Cost for 3,744 luminaires; \$655,000

Payback Calculations: Part-Night & CLO Dimming

- ▣ Total HPS Cobra Head Luminaires to be Replaced;
12,735 (GIS Data August 2012)
- ▣ Annual Energy usage without dimming;
4,133,980 kWh
- ▣ Reduction in Annual Energy usage with Part-night
& CLO dimming on identified luminaires;
449,611 kWh (10.9%)
- ▣ Reduction in annual energy cost @ \$0.119 = **\$53,500**
- ▣ Simple Payback = \$655,000 = **12 years**
\$53,500

Monitoring, Metering & Dimming Systems

- ▣ Factory installed, wireless addressable
 - Requires a Dimming Control Module (DCM) and radio interface in each luminaire
 - Requires software on a host Network Operations Centre (NOC) or on a local municipal-owned site
 - Would incorporate part-night dimming and CLO
- ▣ Allow for continuous monitoring of system performance
 - Identify outages with daily reports
 - Produce and monitor work orders
 - Measure input power at each site
 - Be used for warranty reporting and claims

Monitoring, Metering & Dimming Systems (Cont'd)

- ▣ Would be installed on all new LED Luminaires
 - Only previously identified luminaires (i.e. 3,744) would incorporate Part-night Dimming
 - All luminaires (i.e. 12,735) would have CLO
- ▣ Could be used for metering if approved by the City of Markham and PowerStream

Monitoring, Metering & Dimming Option

Factory Installed, Wireless Addressable

Estimated Incremental Cost:

- ▣ Additional Cost for luminaire components (over base fixture); \$325*
- ▣ Total Cost for 12,735 luminaires; \$4,150,000*

- * Various manufacturers offer optional payment and service plans.
- * Incremental price also includes Part-night + CLO dimming components

Business Case Evaluation: Monitoring, Metering and Dimming

- ▣ Optimized potential Energy Savings - \$81,700
- ▣ Operational Savings due to elimination of biennial road patrolling - \$30,000
- ▣ Repeated site visits by maintenance contractor - \$22,600
- ▣ Reduction in Contact Centre calls - \$10,000
- ▣ Total potential savings - **\$144,300**
- ▣ Simple Payback = $\$4,150,000 = 29 \text{ years}$
\$144,300
- ▣ Continuous Monitoring of Street Lights
 - Better service to the residents
 - Faster and more precise warranty reporting and resolution

Next Steps

- ▣ Decide on desirability of Part-Night & CLO dimming and Monitoring options
- ▣ Discuss metering option with PowerStream based on selection made
- ▣ Prepare material and performance specifications and confirm availability with pre-approved LED luminaire suppliers
- ▣ Incorporate the following options as provisional items in the supply & install tender
 - Part-Night & CLO dimming
 - Monitoring

Questions