



Report to: General Committee

Report Date: March 1, 2013

SUBJECT: LED Streetlighting – Status Update

PREPARED BY: Prathapan Kumar, Senior Manager, Ext. 2989

RECOMMENDATION:

- 1) THAT the report entitled “LED Streetlighting - Status Update” be received;
- 2) THAT the Council endorse the use of light emitting diode (LED) technology as an alternate to high pressure sodium (HPS) for all City streetlights;
- 3) THAT the staff be authorized to proceed with the procurement tender for the supply and installation of LED luminaires to convert the existing HPS cobra-head style luminaires;
- 4) THAT the staff be authorized to include provisional items in the procurement tender for part-time and constant light output dimming (CLO) and monitoring options;
- 5) THAT the Chief Administration Officer be authorized to award the supply and installation contract(s), if the contract(s) are within budget;
- 6) THAT the selected LED luminaires, LED performance standards and specifications be adopted as City Standards;
- 7) THAT the City apply for the grant for the LED retrofit project from the SaveOnEnergy program administered by the Ontario Power Authority (OPA);
- 8) THAT the Commissioner of Community & Fire Services or her designate be delegated authority, to complete and sign the OPA's SaveOnEnergy application form and, if approved, such agreements and other instruments and documents necessary or advisable to obtain the grant;
- 9) AND THAT staff be authorized and directed to do all things necessary to give effect to this resolution.

PURPOSE:

The purpose of this report is to present the results of the pre-qualification of LED manufacturers' products and to present the available monitoring, metering and dimming systems and to seek approval for next steps.

BACKGROUND:

The City of Markham presently manages the municipal streetlight system on City and Regional roadways. The system is comprised of approximately 24,475 high pressure sodium (HPS) luminaires which vary in terms of wattage and style. 12,735 are cobra-heads (52%) and 11,740 (48%) are of decorative fixtures.

Streetlighting in the City currently incorporates a HPS light source. This light source emits a yellowish light that has a very poor color rendering index, i.e. under this light, colors and objects

are not easily distinguishable. The existing luminaires produce significant glare and 'up' light which is a major contribution to sky glow as identified by the International Dark-Sky Association (IDA).

LED lighting is based on a solid state system consisting of a series of tiny chips that fit into an electric circuit. The chips are lit by the movement of the electrons in a semiconductor material. The LED's have a good color rendering index. The color range for LED lights can vary from blue to white, and is measured as temperature in degrees Kelvin. The preferred temperature for streetlights ranges from 3,500 to 5,000°K with 4,300°K being the color temperature of moonlight.

In Jan 2011, Council established the LED Streetlighting Task Force to evaluate LED retrofit options for the City's Streetlighting system. Terms of Reference for the study and the tasks were divided into two phases consisted of the following:

Phase 1:

- Survey the current state of LED streetlight technology
- Survey current local pilot programs
- Develop performance standards for both new and retrofit installations
- Survey the market for compliant products
- Perform life cycle analysis including capital/maintenance/energy costs and disposal impacts
- Develop a business case and compare to current experience

Phase 2:

- Finalization of technical standards
- Preparation and evaluation of RFPQ to select potential LED luminaires manufacturers
- Conduct field testing as part of selection process
- Investigate funding options
- Obtain Council's approval to implement

In April 2011, the City retained Laurilliam Lighting Technologies Inc. to undertake the LED retrofit study. Phase 1 study was completed and presented to the LED Task Force on Nov 22, 2011. Phase 2 study was presented and endorsed by LED Streetlighting Task Force on Feb 7, 2013 (meeting minutes attached under Attachment "A")

The LED retrofit will have the following benefits:

- Increased vehicular and pedestrian safety through better visibility, object recognition and color performance;
- Sixty (60) percent forecasted reduction in energy costs;
- Fifty Seven (57) percent forecasted reduction in maintenance costs, due to the longevity of LED luminaires (approx. 20 years), elimination of the five year group relamping program and regular night patrolling;
- Reduction in the City's streetlighting carbon footprint;
- LED luminaires are certified by the International Dark-Sky Association (IDA) as dark-sky friendly, thus eliminating obtrusive sky glow from streetlights;

Staff worked closely with Laurilliam Lighting Technologies Inc. to evaluate the LED technology and agree with their recommendation to retrofit the City's streetlighting with LED luminaires.

Staff have developed an implementation plan and completed a business case for the conversion program.

OPTIONS/ DISCUSSION:

Procurement Process:

- a) Pre-qualify LED manufacturers and replacement fixtures through the Request for Pre-qualification (RFPQ) process (completed)
 - b) Pre-qualify installation contractors through the RFPQ process (In progress)
 - c) Issue a Request for Proposal (RFP) for supply and installation utilizing the pre-qualified LED manufacturers products (April 2013)
 - d) Award contract(s) to supply and install (May 2013)
- a) In July 2012, RFPQ was released to the market to pre-qualify potential LED manufacturers. Seven proponents submitted their proposals including: Philips Lumec, Cree Canada, LED Roadway Lighting, Acuity Brands, Cooper Lighting, Osram/Sylvania and GE (Tymat). Only four proponents met the City's acceptance criteria - Philips Lumec, LED Roadway Lighting, Cooper Lighting and GE (Tymat). As part of the selection process samples were obtained from the above four pre-selected manufacturers and were installed at various locations to verify their field performance. Based on the field testing, the following three LED manufacturers have been pre-qualified along with specific qualified products:
- Philips Lumec
 - LED Roadway Lighting (LRL)
 - GE (Tymat)
- b) Currently, a pre-qualification (RFPQ) has been released to the market to pre-qualify contractors who will supply the LED products from the identified LED manufacturers noted above, remove the existing HPS Cobra-Head Style Luminaires and install the LED luminaires. This RFPQ closes on March 20, 2013.
- c) A supply and installation RFP will be released in April 2013 to the pre-qualified contractors using the pre-qualified LED products. In addition, LED Streetlighting Task Force recommended to include the following two provisional items in the supply & installation tender for the bidders to price:
- Provision of part-time and constant light output dimmers (CLO) option for 3,744 dimmable streetlights
 - Provision of monitoring & dimming option for all 12,735 streetlights
- If the pricing for the supply and install RFP is favourable, Staff will evaluate awarding the contract for the provisional items subject to CAO approval.
- d) Award contract(s) for supply and install based on the results of the RFP.

Part-Night Dimming & CLO Dimming – Provisional Item

Dimming is applicable only when pedestrian activity is reduced during the night. Streets designed as having low pedestrian activity already have low light levels and cannot be further reduced. Of the 12,735 cobra head luminaires, only 3,744 higher wattage cobra heads are installed where pedestrian activity is medium and might be dimmed. Dimming is usually programmed for 5 hours per night (midnight to 5:00 a.m.). It is recommended that if a dimming option is implemented, it be enacted into a By-law.

Monitoring, Metering and Dimming – Provisional Item

The streetlight monitoring system (SMS) allows for constant monitoring of the status and energy consumption of the streetlighting system. It will also eliminate current costs to patrol, relamp the existing streetlight system and will enhance the service provided to the residents. The SMS can be programmed to provide a controlled constant light output over the life of the luminaire thereby providing additional energy savings.

Conversion of decorative style HPS Luminaires:

Staff will continue to monitor the development of LED technology for decorative fixtures and when the industry is matured will report back to LED Task Force and request funding to implement decorative fixtures conversion.

Coordination with PowerStream:

The retrofit of the City's streetlighting system will also have a significant impact on the existing Streetlighting Services Agreement with PowerStream. Asset Management, Finance and Sustainability staff will prepare the required documentation for submission to PowerStream to justify the City's request for energy fee review due to changes in technology and resulting reduction in energy.

Public Communications Plan:

A public communications plan will be developed as part of the LED conversion program prior to implementation in consultation with Corporate Communications & Community Engagement department.

FINANCIAL CONSIDERATIONS AND TEMPLATE:

Project #13346, "Streetlighting – LED Conversion of Cobra-head fixtures" was approved in the amount of \$7,632,000 as part of the 2013 capital budget. The scope of this project is to convert the 12,735 Cobra-head HPS streetlights to LED technology. This scope does not include the conversion to LED for decorative fixtures and the provisional items for part-night and constant light out dimming (CLO) and monitoring options.

Replacement of Cobra-head fixtures

With the conversion of the Cobra-head to LED technology, Laurillum Lighting Technologies Inc. estimates annual energy consumption costs will be reduced by approximately 60% and maintenance costs will be reduced by 57% once the project is complete. The simple payback on the initial capital costs for this project, based on the savings is approximately 8.3 years. Simple payback represents the initial capital cost divided by the annual cost savings.

Part-Night Dimming & CLO Dimming – Provisional Item

The capital cost for Part-Night Dimming & CLO Dimming will require additional funding of \$655,000. Implementation of this item will generate an additional cost savings of \$53,500 per year with an overall simple payback of 12 years on capital costs. This is a provisional item that will be included in the supply and install RFP but not currently budgeted for. This provisional item will be considered subject to the results of the RFP.

Monitoring, Metering and Dimming – Provisional Item

The capital cost for Monitoring (including Part-Night Dimming & CLO Dimming) will require additional funding of \$4,150,000. Implementation of this item will generate additional savings of \$144,300 per year with a simple payback of 29 years on capital costs. This is a provisional item that will be included in the supply and install RFP but not currently budgeted for. This provisional item will be considered subject to the results of the RFP.

Ontario Power Authority's – SaveOnEnergy Program

The City may be eligible to offset a portion of the capital cost of this project with an incentive from the Ontario Power Authority's SaveOnEnergy Retrofit program. This program provides financial incentives for replacing existing equipment with high-efficiency equipment. The incentive is estimated to be \$315,000, based on the forecasted reduction in electricity consumption for the first year after the conversion is completed. The simple payback period for this project, based on replacement of Cobra-head fixtures only and assuming full receipt of this grant, is a reduction of payback from 8.3 years to 7.9 years.

HUMAN RESOURCES CONSIDERATIONS:

Not applicable.

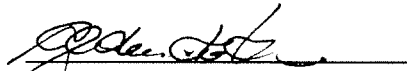
ALIGNMENT WITH STRATEGIC CONSIDERATIONS:

Pursuing the use of energy efficient LED technology in streetlighting is in line with the City's Sustainability initiatives and moves closer to the Greenprint's Energy and Climate objective of zero energy and emissions by 2050.

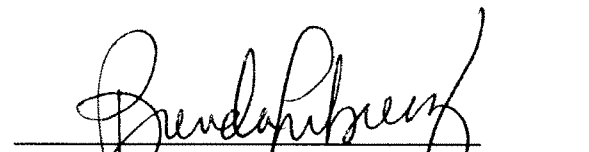
BUSINESS UNITS CONSULTED AND AFFECTED:

The Finance and Sustainability departments have been consulted, provided input and reviewed this report.

RECOMMENDED BY:



Gary Adamkowski, P. Eng.
Director, Asset Management



Brenda Librecz
Commissioner, Community & Fire Services

ATTACHMENTS:

Attachment "A" – LED Streetlighting Task Force Meeting Minutes dated Feb 7, 2013

LED STREET LIGHTING TASK FORCE
February 7, 2013
Ontario Room

<u>Attendance:</u> Regional Councillor Gord Landon Councillor. Howard Shore Councillor Alex Chiu Guest: Bill Smelser, Consultant, Laurilliam Lighting Technologies Ltd.	<u>Staff</u> Brenda Librecz, Commissioner of Community & Fire Services Gary Adamkowski, Acting Director, Asset Management Prathapan Kumar, Senior Manager, Capital ROW & Environmental Assets Rachel Prudhomme, Manager of Special Projects Graham Seaman, Senior Manager Sustainability Office Andrea Tang, Manager of Financial Planning Jonathan Tate, Senior Business Analyst Laura Gold, Council/Committee Coordinator
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The LED Street Lighting Taskforce convened at 9:05 a.m., with Regional Councillor Gord Landon presiding as Chair.

1. LED STREET LIGHTING TASK FORCE

Mr. Bill Smelser, Consultant, Laurilliam Lighting Technologies Ltd., was in attendance to provide an update to the LED Street Lighting Taskforce. The following presentations were provided: (1) Phase II Works; and (2) Monitoring, Metering & Dimming Systems.

Copies of both presentations were provided to the Committee.

Phase II Works Presentation

The presentation included the following information: recap of phase 1 works completed to date; technical specifications for the Phase II works; procurement process, RFPQ, Primary evaluation of RFPQ, field testing of product samples; pre-qualified LED manufactures; Qualified Replacements; funding sources; payback calculations and available incentive programs.

Highlights of the presentation:

- Installation of the LED streetlight would result in approximately 60% reduction in hydro use;
- Life expectancy of the LED streetlight driver is 20 to 21 years;
- Projected annual operating savings from LED conversion is estimated to be \$924,000 (based on the selected lowest wattage fixtures and current hydro rates); with a simple payback period of 8.2 years.

Moved by Alex Chiu
Seconded by Councillor Howard Shore

That the Committee endorse the presentation on Monitoring, Metering & Dimming Systems; and,

That a staff report be brought forward to the General Committee on this matter; and further;

That staff be directed to do all things necessary to give effect to this resolution.

CARRIED

The Committee wanted to ensure that the installation of the monitoring system should not preclude the amalgamation of systems in the future (e.g. adding traffic signals, water metering etc.). The Consultant reported that additional features can be added to the monitoring system in future.

It was noted that York Region is also looking into installing LED street lighting. Staff was requested to contact York Region on this matter.

ADJOURNMENT

The LED Street Lighting Task Force meeting adjourned at 10:32 pm.