

To: Community Services and Finance Committee

From: Ron Diskey, Commissioner,
Community Services Department

Stephanie Sinnott, Executive Director Finance Services/
Treasurer
Office of the City Manager

Report Number: CS-16-57

Date of Report: June 16, 2016

Date of Meeting: June 27, 2016

Subject: L.E.D. Street Light Conversion Project

File: E-1400

1.0 Purpose

The purpose of this report is to recommend that the City proceed with converting all street lights within the City of Oshawa to light emitting diode (L.E.D.) technology.

2.0 Recommendation

That the Community Services and Finance Committee recommend to City Council:

That, based on Report CS-16-57 dated June 16, 2016, L.E.D. Street Light Conversion Project:

1. That staff proceed with the L.E.D. Street Light Conversion Project that will result in all street lights converted to L.E.D. technology;
2. That the City of Oshawa enter into a formal partnership agreement with Oshawa Power and Utilities Corporation (O.P.U.C.) to manage the L.E.D. Street Light Conversion Project;
3. That the Mayor and Clerk be authorized to execute a formal partnership agreement with O.P.U.C. as approved by Legal Services and Finance Services;
4. That the City of Oshawa move forward with the staff recommended option of a new colour scheme for street lights, new street light arms and the reconditioning of the associated street light pole hardware as part of the L.E.D. conversion at an additional cost of approximately \$392,760;

5. That an amount not to exceed \$8.41 million be obtained through the issue of a 10-year serial debenture by the Regional Municipality of Durham to finance the conversion of the City's street lighting to LED technology.

3.0 Executive Summary

The energy and maintenance costs of the existing decorative and cobra style, high pressure sodium (H.P.S.) street light system has increased significantly over the past 10 years. These increases are primarily related to increases in utility rates. The best option to reduce this cost and lessen the impact of future increases is to reduce the energy demand for the total street light system.

L.E.D. technology is now generally accepted as the solution to reduce energy consumption in the on-grid street lighting application. A number of municipalities in Canada and the United States have started or completed conversion from H.P.S. to L.E.D. technology and are reporting energy reductions exceeding 50% and correspondingly significant cost savings in both energy and maintenance. The City has converted to L.E.D. street lighting in some specific retrofit areas and has established L.E.D. technology as the standard for all new on-grid installations.

In February of this year, the City hired RealTerm Energy who is part of a global team of infrastructure specialists and is the preferred management vendor of the Association of Municipalities of Ontario (A.M.O.) and Local Authority Services (L.A.S.) to conduct an Investment Grade Audit (I.G.A.) which included:

- The detailed mapping of the City's street light inventory which is invaluable to both the City and O.P.U.C..
- Examine in detail the City's utility and maintenance expenses for 2015
- Establish current baseline results for energy consumption and maintenance expenses
- Projected the estimated costs to complete an L.E.D. street light conversion project within the City
- Projected the estimated cost savings that could be realized by converting the street lights to L.E.D. technology

The information contained in the I.G.A. indicates that the City could experience an annual reduction of approximately 62% in street light energy consumption and approximately 80% reduction in maintenance expenses, based on current energy costs and maintenance frequency, by converting to L.E.D. technology. L.E.D. street lights come with a 10 year warranty and can last up to 100,000 hrs which will result in a significant reduction in replacements.

Currently there are monetary incentives offered by the Independent Electricity System Operator (I.E.S.O.) of approximately \$1.16 million that the City could receive by proceeding with a full conversion of street lights to L.E.D. technology. These incentives are regulated by the Independent Electricity System Operator (IESO) and the current

incentive program is scheduled to be reduced by 40% of the current incentive on June 20, 2016. The City applied and received pre-approval for the current incentives prior to the April 30 deadline. If the City does not proceed at this time, the incentive value will be significantly reduced by approximately \$465,000.

At this time, the City does not have specialized staff dedicated to street lighting so staff have had discussions with O.P.U.C. regarding their ability to manage this project. Since both the City and O.P.U.C. have a vested interest in this project, it is recommended that a partnership be developed with O.P.U.C. to manage the street light conversion project.

4.0 Input From Other Sources

The following branches and other groups were consulted in the preparation of this report:

- Finance Services
- Purchasing Services
- Facility Management Services
- Development Services
- O.P.U.C.
- Staff reviewed Council reports pertaining to L.E.D. Street Light Conversion Projects from other municipalities that recently proceeded with projects. Some of those municipalities include Aurora, Barrie, Hanover, Town of Whitchurch-Stouffville, and Town of the Blue Mountains
- B.I.A.
- A.M.O.

5.0 Analysis

5.1 L.E.D. Technology Assessment

The cost of the existing high pressure sodium (H.P.S.) street light system has increased significantly over the past 10 years. These increases are primarily related to increases in utility rates. The best option to reduce this cost and lessen the impact of future increases is to reduce the energy demand for the street light system and the resulting maintenance savings associated with it.

L.E.D. technology is now generally accepted as the solution to reduce energy consumption in the on-grid street lighting application. A number of municipalities in Canada and the United States have started or completed conversion from H.P.S. to L.E.D. technology and are reporting energy reductions exceeding 50% and correspondingly significant cost savings in both energy and maintenance. The City has converted to L.E.D. street lighting in some specific retrofit test subdivision streets with positive results and has established L.E.D. technology as the standard for all new installations.

In addition to the energy related financial benefits, here are some of the other benefits of L.E.D. technology:

- L.E.D. lights can last up to 100,000 hours, resulting in lower maintenance costs due to reduced replacements
- Provides a more accurate colour rendering. This means objects will appear more natural under a L.E.D. light source compared to an H.P.S. light source.
- They do not contain mercury or lead and don't release any poisonous gases if damaged.
- Converting all of the street lights to L.E.D. will reduce the City's carbon footprint by reducing the amount of Green House Gases by approximately 432 metric tonnes per year and approximately 9,925 metric tonnes over the lifetime of the fixture.
- The light produced is very directional and therefore there is less light pollution where it is not either needed or desired.
- Potential to relocate existing street lights that are currently installed above and/or between high voltage power lines which currently require specialized staff/procedures to maintain. Relocating of these street lights would benefit both the City and O.P.U.C. from a Health and Safety perspective, increase efficiency and productivity, and reduce future costs.

The use of solar powered street lights and other technologies was also reviewed. The obvious advantage of solar technology is to eliminate electricity consumption and the associated costs. Some of the disadvantages of this type of technology include the following:

- The initial cost of solar/battery powered street lights is very expensive compared to conventional street lights and is only cost effective in areas where electrical power is not available or would be too expensive because of extensive underground trenching or long pole runs.
- Snow or dust, combined with moisture can accumulate on the solar panels which could reduce or stop energy production. This would cause a liability increase to the City.
- Each location would have to be individually assessed for its suitability. The solar panels can't be obstructed by trees, tall buildings, etc.
- Risk of theft of the solar panels.
- Rechargeable batteries need to be replaced several times over the lifetime of the fixtures adding to the total lifetime cost of the light.

For these above mentioned reasons, solar/battery powered street lights are not being considered as an option for an on-grid application. It is a feasible option for off-grid applications such as trail networks or open space situations where electrical power lines are not easily accessible.

5.2 Assessment of the Investment Grade Audit

The City entered into an agreement with L.A.S. and their service provider Realterm Energy to conduct a detailed analysis (investment grade audit) of the City’s streetlight infrastructure to inform staff and Council of the actual costs and savings for the L.E.D. streetlight conversion. This audit not only confirmed the detailed financial impact (Table 1.0) and payback analysis (Table 1.1), it has also provided the detailed mapping and cataloguing of the City’s streetlighting infrastructure for asset management and sharing with O.P.U.C. for accurate inventory information.

Table 1.0 Financial Impact			
	Before Upgrade	Post Upgrade	Variance
Number of Fixtures	12,678	12,678	-
Annual Electricity Consumption (kWh)	9,131,137	3,453,864	5,677,273
Annual Electricity Costs	\$2,299,624	\$1,042,921	\$1,256,703
Annual Maintenance Cost (5 year average)	\$217,225	\$43,445	\$173,780
Total Street Lights Expenditures	\$2,516,849	\$1,086,366	\$1,430,483 *
Average Annual Cost per Fixture	\$198.52	\$86.00	\$112.52

* a 3% energy price inflation rate and 2% maintenance cost inflation rate is added annually

Table 1.0 indicates there will be a cost savings of approximately \$1.26 million in annual energy costs and \$174,000 in annual maintenance costs for a total savings of approximately \$1.43 million annually.

Table 1.1 Payback Analysis	
L.E.D. Street Light Conversion Project Summary	
Number of Fixtures	12,678
Total Project Costs (includes Downtown)	\$9,285,412
IESO Incentive	- \$1,162,661
Net Project Costs (includes Downtown)	\$8,122,751 *
Avg. price per Fixture	\$640.70
Payback Period (Years)	5.3

* a 3% energy price inflation rate and 2% maintenance cost inflation rate is added annually

Table 1.1 indicates that the total project costs for the street light conversion will be approximately \$8.12 million after the I.E.S.O. incentive of approximately \$1.16 million is applied. The savings will fund this project with a payback period of approximately 5.3 years.

Standardizing Light Fixtures

The process of converting all the street lights to L.E.D. technology will also provide a great opportunity to standardize several decorative light fixtures throughout the City. Some of the locations where different decorative light fixtures are currently being used are:

- Airport Boulevard
- Laval Drive
- Colonel Sam Drive
- City Hall

By choosing a standard light fixture to be used at these non-subdivision locations, there won't be as many varieties of light fixtures in stock and the costs will be reduced as some of these light fixtures are very costly. Currently there are standards in-place for new subdivisions and these standards will continue to meet the program objectives.

5.3 Downtown Decorative Fixtures

As indicated in the Plan 20/Twenty and recent discussions with the Downtown B.I.A., there is an interest to modernize the downtown streetscape furniture by changing the colour from burgundy to black. This includes all of the painted street light hardware including the light fixture, light fixture arm, banner arms and planter arms. Since a contractor will already be installing the L.E.D. light fixture, it would be prudent and financially responsible to have them repaint and/or replace the other street light pole hardware at the same time. Initial investigations regarding the repainting of the street light pole hardware identified some of the following issues:

- Repainting – The existing arms are galvanized aluminum with a burgundy powder coat. In order to repaint the existing arms, it will be necessary to remove them and transfer them to a paint shop to be acid-washed to remove the old paint, and then sandblasted to prepare them for a new powder coating of black paint. This cannot be done on site.
- Cracks and metal fatigue – A significant number of the light fixture arms are showing signs of metal fatigue around the mounting holes due to wind and other vibration damage over time. This is to be expected with aluminum arms which are significantly softer than steel. It is estimated that approximately 20% of these arms would need to be replaced now because of this fatigue. Also, the arms that are not replaced will continue to deteriorate and will need to be replaced in the near future (less than 5 years).
- Water leakage – There have also been some issues of water leaking between the light fixture arm and the light fixture. The arm and the light fixture are threaded together and over time the threads lose their integrity from normal vibration, resulting in the threads becoming dull and allow water seepage into the fixture below.

- Reconditioning process – Removing, sandblasting and repainting these light fixture arms would aggravate the issue of the attaching threads resulting in them becoming less sharp which would allow more potential water seepage to occur in the new L.E.D. light fixtures.
- Warranty implications – Replacement downtown decorative L.E.D. light fixtures include a 10 year manufacturer warranty from the time of installation. However, by using the existing light fixture arms with the known leakage problem (despite the new paint and weather sealing that could be applied at re-installation), the company would not warrant the new fixtures from water damage if attached to the reconditioned light fixture arm since this is a known problem.
- Light fixture arm options – The location of the bolt holes in the decorative poles severley limits the choice of replacement arms. Working with Acuity Lighting, it was determined that the selection of new arms is limited to replacing them with the same style as the present wheel spoke look.
- Light fixture Arm Options Cost Comparison
 - The cost to remove and repaint the existing arms and recondition the other street light pole hardware is estimated to be approximately \$927 per pole for a total of \$326,400. This includes the purchase of 20% replacement arms due to failure.
 - The cost to replace the arms with new black steel arms (keeping the same ‘wheel spoke’ look) and recondition the other street light pole hardware is approximately \$1,116 per pole for a total of \$392,760.
 - Another benefit of replacing the light fixture arms is the ability to inspect all of the electrical connections in the pole and light fixtures. Some concerns have been identified with potential grounding issues that need to be fully investigated.

Table 1.2		
Change of Downtown Decorative Street Lights and Pole Hardware		
	Price Per Pole (approximately)	Total Price (approximately)
Repaint Existing Light Fixture Arms	\$927	\$326,400
Replace Light Fixture Arms with Same Style	\$1,116	\$392,760

Based on this information, it is staff’s recommendation to proceed with replacing the existing light fixture arms with new steel arms in the same ‘wheel spoke’ style. This will provide a secure, waterproof connection between the new light fixture arm and light fixture, and eliminate the warranty issue related to water seepage. The BIA has been informed of this option and is supportive of the change. The recommended option to replace the

downtown fixtures at a cost of \$392,760 and has been incorporated in the total project cost as indicated in table 1.1.

5.4 Explanation of L.A.S., A.M.O. and RealTerm Energy

Local Authority Services (L.A.S.) is a wholly owned subsidiary company of the Association of Municipalities of Ontario (A.M.O.) which helps its customers 'save money, make money and build capacity' through co-operative procurement efforts and innovative training, programs and services. L.A.S. has offered a complete turnkey L.E.D. street light service to the municipal market because the technology is reliable, superior and now very cost-effective. Over 90 municipalities have decided to upgrade their street light network with L.A.S. since the program launched in 2013.

L.A.S., a not-for-profit corporation of A.M.O., developed this service to help municipalities ensure they could protect existing assets, remove risks, and maximize savings while upgrading to top quality L.E.D. street lighting. L.A.S. has assembled a team of highly qualified design and project management services along with product supply from one of the top manufacturers in the world selected by competitive tender process.

Realterm Energy, a RealTerm Global Company, creates and fosters long term partnerships with private and public companies as well as various government agencies to deliver innovative and cost-effective lighting infrastructure solutions. Realterm Energy is a project management company capable of managing a Turnkey L.E.D. Street Light Conversion Project consisting of:

- Using the GPS/GIS data collected in the I.G.A. to prepare lighting designs for each unique street;
- Having an installation contractor remove the existing H.P.S. street lights and replace with L.E.D. street lights;
- Make arrangements for all Electrical Safety Authority (ESA) permits and inspection of work;
- Recycling of the removed H.P.S. luminaires;
- Using local electrical contractors whenever possible to complete all or portions of the field work. This is dependent on the contractor's ability to dedicate staff and equipment to the project so that it is completed within the required timeframe.
- Work completed during the day and night time. Night time work at busy intersections when traffic levels are lower, could result in less traffic control requirements, more efficiencies and less disruption to the community.
- Working with O.P.U.C. to update the utility bills on the City's behalf to reflect the field changes implemented;
- Provide a 1 year warranty on the workmanship completed within the work area; and
- Transfer of the manufacturer's warranty of 10 years for the luminaire and 12 years for the photocell.

5.5 Procurement Process

5.5.1 Project Management Service Provider

In 2012, L.A.S. received a significant number of requests from municipalities to provide assistance in selecting a provider for L.E.D. street lights. The L.E.D. street light marketplace was and is still crowded and confusing to the average municipal staff and L.A.S. was requested to develop a complete turn-key service that provided product selection, project management, design, financing options and all other required services in one single offering. L.A.S. developed a selection committee that conducted a market scan that included interviews with all available providers in the Ontario marketplace. The information received through this interview process helped the L.A.S. Selection Committee to develop a set of technical standards into their selection criteria for a service partner.

The primary standard for street light installations throughout North America is the RP-8 American National Standard Practice for Roadway Lighting. To ensure that a selected service provider would exceed municipal procurement standards, L.A.S. sought a service provider that had qualified personnel competent to perform independent photometric analysis and roadway design to meet and exceed RP-8 standards. In addition to this, L.A.S. wanted a service provider that could provide:

- Lighting design solutions that includes Photometric Lighting Layouts, 2D Line Drawings, 3D Full Image Drawings, Material Specifications, Virtual Streetscapes and Budget Analysis.
- Design work should be completed street by street offering not simply a representative sample of roadway types.
- Complete GIS/GPS mapping of existing street light inventory for municipal asset management purposes.
- Ready access to contractor/installer base throughout Ontario.
- Complete recycling and disposal of removed products to meet or exceed requirements under the SaveONenergy incentive program.
- An optional financing component to interested municipalities.
- Robust project management and quality management processes backed by delivery guarantees.

In 2013, L.A.S. conducted interviews with 17 companies from the L.E.D. street light service industry which resulted in the hiring of Realterm Energy as the service provider. During the interview process it was determined that only Realterm Energy was able to provide the full suite of services outlined in the technical standards and had the financial capacity to support the complete Ontario municipal marketplace.

5.5.2 Product Supplier

In 2014, L.A.S. put out a Request for Proposal (R.F.P.) for the supply of street light luminaires to ensure its members were getting value and high quality products. L.A.S.

ensured that their R.F.P. process met and surpassed municipal procurement standards supporting a competitive search for suppliers offering quality products at an affordable price while remaining unbiased and open in its wording. The R.F.P. document was developed using various specification guides, pilot studies, protocols, standards, and tender documents from Canada and the United States. The R.F.P. document and subsequent submissions were reviewed by an Evaluation Committee comprised of 10 experts from Los Angeles, British Columbia, Montreal and Ontario, as well as 2 L.A.S. and 2 R.T.E. staff members.

As a result of the R.F.P. process, L.A.S. received strong submissions from 5 internationally recognized brands. The committee evaluated these submissions in two distinct phases based on the following factors:

- Company experience and qualifications;
- Financial background;
- Fixture quality;
- Fixture performance;
- Value added components; and
- Overall proposal completeness, clarity and organization

Those submissions which met the minimum 75% scoring under the above criteria were then evaluated based on the individual fixture and alternate component price submissions. Then an overall economic evaluation of the fixtures based on six standard municipalities was completed for the top two scoring submissions. After careful and thorough analysis of the submissions, the Evaluation Committee decided to award the supply contract to Cree Canada for the cobra head style light fixtures as they represent the best overall value for its members. If the City proceeds with the L.E.D. street light conversion at this time, the City would benefit from the luminaire prices secured in 2014 before the value of the Canadian dollar started to decline. In addition to the cobra head street lights, Realterm energy is working with Acuity Brand lighting to select replacement decorative L.E.D. style lights that are similar to the existing H.P.S. decorative lights. In order for the replacement light fixtures to receive the IESO incentives, they must be listed on the DesignLights Consortium (DLC) qualified products list. Wherever possible, decorative light fixtures that are similar in style and on the DLC list will be chosen.

6.0 Financial Implications

As indicated in the I.G.A. prepared by RealTerm Energy, the cost to convert Oshawa's 12,678 street lights to L.E.D. technology is approximately \$9,285,412. This will result in the City receiving an incentive rebate in the amount of approximately \$1,162,661 and annual savings of approximately \$1,256,703 in electricity costs and \$173,780 in maintenance costs.

The cost to change the downtown painted street light hardware (light fixture arm, banner arms, planter arms, pole caps) is approximately \$392,760. The above noted project costs include the the cost to replace the existing light fixture arms with a steel fixtures and repaint all of the other street light hardware. Since a contractor will already be installing the

new L.E.D. light fixture, it is prudent and financially responsible to have them replace the other hardware at the same time.

It is recommended that this project be funded by the issuance of a 10-year serial debenture through the Regional Municipality of Durham in an amount not to exceed \$8.41 million.

The total project cost, rounded to the nearest thousand, is approximately \$8.408 million as detailed below:

Street light Conversion	\$8,123
Debt Issuance Costs	142
Non-rebateable HST	<u>143</u>
Total	<u>\$8,408</u>

The new debenture, in an amount not exceeding \$8.41 million, will require annual debt payments (principal and interest) of approximately \$1.04 million starting in 2017. The annual savings in electricity and maintenance costs are estimated at \$1.43 million which will be used to offset the debenture payments.

The residual saving remaining after the debt payment, will be absorbed into the City's operations creating a favourable budget impact of approximately \$400,000 for the term of the debenture.

The debenture necessary to fund this project is within the City of Oshawa's debt limit. The Treasurer has updated the Municipality's annual debt limit and because this limit has not been exceeded, Ontario Municipal Board approval is not required.

If the City does not proceed with the Street Light L.E.D. Conversion Project at this time, some of the negative impacts that will be recognized are:

- Lose \$3,600 each day in energy and maintenance costs;
- IESO incentives will be reduced by approximately \$465,000;
- Lose 2014 pricing for luminaires that is further disadvantaged by the significant decrease in the Canadian dollar;
- Lose exchange rate guarantee;
- Higher installation costs of the cobra and/or decorative street light fixtures;
- Loss of significant maintenance fee reductions;
- Potential loss of O.P.U.C. support;
- Significantly higher costs for the colour scheme conversion in the B.I.A. at a later date;
- Continued Health and Safety risks, reduced efficiency and productivity, and high maintenance costs associated with maintaining the street lights installed above and/or between high voltage power lines which currently require specialized staff/procedures.

7.0 Relationship to the Oshawa Strategic Plan

This report addresses the Oshawa Strategic Plan by responding to the goal of "Environmental Responsibility," with the theme of "Proactive Environmental Management" by developing and implementing corporate and community plans to reduce greenhouse gas emissions and energy use. It also responds to the goal of "Financial Stewardship", with the theme of "Responsible Taxation" by proactively applying for public sector funding.



Glenn Simmonds, Director,
Operations Services



Stephanie, Sinnott, Executive Director of Finance Services/Treasure
Office of the City Manager



Ron Diskey, Commissioner,
Community Services Department