

**THE CORPORATION OF THE CITY OF WINDSOR**  
**OFFICE OF THE CITY ENGINEER- Engineering**

**MISSION STATEMENT:**

*"Our City is built on relationships – between citizens and their government, businesses and public institutions, city and region – all interconnected, mutually supportive, and focused on the brightest future we can create together."*

<b>LiveLink REPORT #: 16401 SW/10870 AFB/11647</b>	<b>Report Date: November 15, 2013 (PW#3509/lp-11/25/13)</b>
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**To: Mayor and Members of City Council**

**Subject: Streetlight City Wide LED Conversion**

**1. RECOMMENDATION: City Wide: X Ward(s): \_\_\_\_\_**

- I. That Administration **BE AUTHORIZED** to collaborate with ENWIN to prepare a request for proposals/request for tender (the "RFP/RFT"), to be released and managed by ENWIN, as well as any other related processes required to support the RFP/RFT for the conversion of city streetlights to LED fixtures, subject to the requirements of all applicable Purchasing Bylaws and policies; and
- II. That Administration together with ENWIN **DEVELOP** a Project Charter for the LED streetlight conversion project that will **BE APPROVED** by the CAO and the President of ENWIN and will **BE COMMUNICATED BACK to City Council**; and
- III. That a capital project **BE ESTABLISHED** for the purposes of LED conversion, and that all capital costs related to the project initially **BE INTERNALLY FINANCED** by the City and that permanent funding be from the annual budgeted savings in streetlight energy and maintenance; and
- IV. That Administration continue **TO PURSUE and BE AUTHORIZED to sign grant applications for** additional sources of funding, i.e. grants, related to LED conversion.
- V. That the installation of LED fixtures **BE DEEMED** standard for all new streetlight installations for City capital works and subdivision projects where streetlights need to be replaced or newly installed; and
- VI. That any new pilot projects for new street lighting technologies not related to, or affecting the technologies required by the RFP/RFT, **BE SUBJECT** to approval of the CAO, subject to CAO Delegation of Authority limits under the Purchasing Bylaw and to available funding; and

- VII. That the Chief Administrative Officer and City Clerk **BE AUTHORIZED** to execute an agreement with ENWIN for the provision of streetlight maintenance, satisfactory in legal content to the City Solicitor, in financial content to the City Treasurer, and in technical content to the City Engineer.
- VIII. That Administration **BE AUTHORIZED** to carry out any other acts reasonably necessary to bring effect to the above resolutions, and that the Chief Administrative Officer and City Clerk **BE AUTHORIZED** to execute any document for that purpose, satisfactory in legal content to the City Solicitor, in financial content to the City Treasurer, and in technical content to the City Engineer.

## **EXECUTIVE SUMMARY:**

This report explores the option to convert existing High Pressure Sodium (HPS) streetlights to Light Emitting Diodes (LEDs) fixtures. The current HPS fixtures require relamping every five years, while the new LED fixtures are expected to last at least 15 years. While conversion to LED results in reduced maintenance costs of approximately 50% due to the longevity of LED fixtures, and elimination of the five year group relamping program and regular night patrolling, the more significant savings are expected to be achieved from the 29% energy savings resulting from the new technology. These results have been substantiated through the experience from other municipalities that have already made the change to LED and the LED pilot projects conducted by the City and ENWIN in seven locations across the City.

In addition, other environmental & safety benefits include:

- Major reduction in the City's street lighting carbon footprint.
- Increased vehicular and pedestrian safety through better visibility, object recognition and colour rendition.
- LED fixtures are certified by the International Dark Sky Association (IDA) as dark sky friendly, thus eliminating obtrusive sky glow for street lights.
- Assist in satisfying the goals and recommendations outlined in the City's Environmental Master Plan and City's Strategic Community Plan.

In summary, the expenditure of approximately \$14.3 million to convert the City from HPS to LED lamps is projected to save \$36.5 million of the 15 year life of the LED lamp. It is proposed that the upfront capital costs of the conversion be internally financed with permanent funding being achieved over approximately eleven years from the future energy & maintenance savings generated. Therefore, it is being recommended that the City, in collaboration with ENWIN issue a RFT/RFP to convert HPS lamps to LED fixtures and that ENWIN manage the conversion as outlined in a project charter that will be developed to assist in managing this project.

## **2. BACKGROUND:**

In 2012, there were 23,553 light fixtures in the City (16,234 on City-owned poles, 7,257 on ENWIN owned-poles, 47 on Bell Canada poles, and 15 on Hydro One poles) with a 2013 Operating Budget of \$5.07M (energy costs \$3.54M and operating and maintenance costs \$1.53M). Energy costs are comprised of the price for the electricity used to power the streetlights, additional fees related to various provincial initiatives, and distribution and

administrative fees approved by the OEB. From 2007 to 2013, the streetlight energy budget has risen by approximately 104% (\$1.74M in 2007 to \$3.54M in 2013), and the trend is continuing.

ENWIN maintains the streetlight system on behalf of the City as per the 2002 agreement with oversight and project management from City Administration.

Discussions have been taking place between City Administration and ENWIN for a number of years regarding the conversion to LED streetlighting. The focus of this report will be to address the conversion of streetlights from the current High Pressure Sodium (HPS) bulbs to LED. Administration is continually looking for ways to save money and improve services. Options surrounding ownership of the streetlighting infrastructure, service delivery options, and other factors that impact on costs and/or service levels will continue to be considered and reported to Council as warranted.

### **3. DISCUSSION:**

#### ***Background Information on LED Street Lights***

On January 24, 2011, Council approved the installation of two test sites for LED street lights on Raymond Avenue between Jefferson Boulevard and Homedale Boulevard in front of Dr. David Suzuki School, and one on Matchette Road in front of Ojibway Park. These pilot projects were established to assess whether there are sufficient potential energy savings to further explore LED conversion. ENWIN has also conducted a pilot program at five different locations throughout the City. The results of the pilot projects are as follows:

##### ***Raymond Avenue (in front of Dr. David Suzuki School)***

Ten LED lights were installed on Raymond Avenue between Jefferson and Homedale Blvd in August 2011. The lights selected satisfied a residential road classification standard to remain consistent with the existing lighting levels in the area. There have been no issues to date regarding the lights. The lighting levels of the LED fixtures provide lighting that exceeds the City's illumination requirements. In addition, the LED fixtures give more uniform lighting levels on the street in comparison to HPS fixtures.

In comparing the energy consumption of the LED fixtures with the old HPS fixtures on Raymond Avenue, ENWIN has reported a 58% energy savings compared to existing HPS lights. The light distribution is comparable and achieves the light requirements set forth in RP8 (lighting guidelines for North America).

##### ***Matchette Road (across from Ojibway Park)***

Ten LED lights were installed on Matchette Road between Titcombe Road and Armanda Street in May 2012. The lights selected satisfied a collector road classification standard to remain consistent with the existing lighting levels in the area. The fixtures deliver excellent lighting level output and uniformity that exceeds the City's standards for a collector road.

There was a 32% energy savings conversion compared to existing HPS lights. The difference in savings between the two pilot sites could be due to the higher road classification which required higher lighting levels or the fixture itself.

### ***ENWIN Pilot Project (5 locations)***

30 LED fixtures were installed in three locations: Jefferson Boulevard between Riverside Drive and Wyandotte Street, Sunset Avenue between Wyandotte Street and University Avenue, and Venetian Avenue between McHugh Street and Firgrove Drive. The fixtures deliver excellent lighting level output and uniformity that exceeds the City's standards for the areas. Energy use was not measured for these fixtures but the calculated energy savings is estimated to be 47% for a 60W LED street light compared to a 100W HPS street light.

### ***The Public Response to the Pilot Projects***

All the pilot projects received positive reviews from the public and Windsor Police Services, as the white LED light provides improved colour rendering and visibility which the Police consider beneficial from a public safety perspective.

A survey of residents in the area was undertaken in conjunction with the ENWIN pilot project to determine the support of LED fixtures. Overall, there was positive response to the intensity, colour, and uniformity of the fixtures. Noteworthy, 70% of the respondents would support the conversion of the entire city to LED fixtures. All respondents indicated energy conservation and reduction of greenhouse gasses (GHG) was important to them to varying degrees.

### **Relamping and Maintenance Costs with HPS Street lights**

Currently, the City standard is to have all HPS bulbs replaced every five years in order to proactively lower maintenance costs. This is to coincide with the HPS bulbs' 5 year lifespan. The City experiences a rapid increase in maintenance costs at the end of the HPS bulb lifespan (end of Year 4 of the bulb). The last relamping contract was awarded in 2006 and the next contract was planned to be early 2013. Instead of moving forward with a HPS relamping in 2013, a proposal to further examine a move to LED lighting technology is being brought forward for consideration.

### **Current State of the Streetlights**

Because the HPS streetlights are presently due for relamping, many parts of the City are experiencing elevated levels of streetlight outages. This is an expected result as the bulbs with 5 year lives are entering Year 7 of service. Also as expected, maintenance costs have increased over this period to perform an increasing number of one-off HPS replacements in lieu of a full-scale relamping.

It is noted that not all streets in the City have streetlights. Some streets have only intersection lighting. Any requests to improve lighting for a residential street will continue to follow the Local Improvement Policy. Improved streetlighting for collectors and arterials are subject to annual capital funding.

### **The Practice in Other Municipalities**

There are several Ontario municipalities, including Welland, Mississauga, Markham and North Bay, which have embraced the conversion from HPS to LED lighting fixtures and have, or are in the process of converting all their fixtures to LED (Appendix A). In addition to converting fixtures, Welland and Mississauga are installing advanced technology to control and monitor each individual street light.

There are a number of benefits to have the ability to control individual lighting fixtures, including:

- Extending the lifetime of the LED devices, by operating them at lower current levels initially, which produces less heat that degrades the devices (this assumes the LED luminaires are initially oversized by 30% relative to achieving North America Lighting Standards in order to maintain compliance over their lifetime as their output slowly declines);
- Precisely measure the amount of energy consumed by streetlights, thereby enabling more accurate billing, as well as tracking of GHG emissions;
- Collect daily information on the operational status of the luminaire, i.e. malfunctions or power loss, and communicate such status to a central managing authority, thereby improving maintenance and lighting service to the community;
- Dimming capability would allow for the street light to be dimmed during early morning hours when traffic volumes are low for potential energy savings as well as seasonally or when other natural lighting conditions allow. This functionality can be integrated in some cases with other public utility assets, such as system monitoring and control technology;
- Elimination of night patrols in favour of electronic monitoring to ensure compliance with Ontario Regulation 239/02 under the *Municipal Act, 2001* (Minimum Maintenance Standards for Municipal Highways (MMS));
- Safety improvements as the controls can be connected to the 911 system. This would allow a 911 operator to remotely enable a street light closest to the origin of a call to flash repeatedly for easier identification by emergency personnel, i.e. EMS. Also, the light levels could be raised or lowered as an event may require; for example, raise lights to identify crimes in process, to assist with clean up of accident, etc.

#### **Other Benefits of LED Fixtures**

Besides the projected financial savings, there are other deciding factors to converting to LED fixtures. Some of the benefits are as follows:

- Major reduction in the City's street lighting carbon footprint.
- Increased vehicular and pedestrian safety through better visibility, object recognition and colour rendition.
- Fifty percent forecasted reduction in maintenance costs due to the longevity of LED fixtures, and elimination of the five year group relamping program and regular night patrolling.
- LED fixtures are certified by the International Dark Sky Association (IDA) as dark sky friendly, thus eliminating obtrusive sky glow for street lights.

In addition, the conversion to LED fixtures will assist in satisfying the goals and recommendations outlined in the City's Environmental Master Plan and City's Strategic Community Plan.

#### **Staying Current**

Shortly after 2000 and as a result of the effects of provincial legislation casting doubt on whether utilities could operate street lighting, a focus group was formed by a small group of street light staff from various municipalities to support each other regarding different street light issues. The number of Ontario municipalities, including Windsor, who are part of the focus group, has grown to over 35. The focus group discusses current topics such as LED lighting and other lighting technologies, and OEB decisions that may affect the billing of energy or maintenance of

street lights, asset management of the system, i.e. poles, wiring, request for attachments from other utilities and the relationship issues with the energy providers.

In the past year, the Canadian Urban Institute (CUI) and the Toronto Atmospheric Fund (TAF), with support from the Natural Resources Canada (NRC), formed LightSavers Canada, a national consortium to assist provincial and municipal governments with advancements in lighting technology to reduce energy demand and carbon emissions. LightSavers Canada has been researching the progress of LED lighting conversion across Canada, promoting the benefits of LED lighting and control technology, and investigating financial programs for municipalities. The City of Windsor is a member of LightSavers and benefits from the LED information available through that group.

LightSavers Canada has asked if the City of Windsor would be interested in participating in developing/testing a tool to assist municipalities in evaluating new LED fixtures on the market. See Appendix B. Provided that there are no concerns due to this proposal, Administration will continue to participate with the LifeSavers Canada and the Focus Group until directed otherwise as there is no charge for membership other than travel expenses.

### **Going Forward – Type of Street Lighting**

Street lighting in the City is at a crossroads, with three potential options for future:

1. Continue with status quo by relamping the HPS street lights fixtures and the review of a city-wide streetlight conversion be postponed until the next required relamping in 2019.
2. Continue with status quo and require that LED streetlight fixtures be installed for all new streetlight installation for capital projects and new subdivision developments.
3. Replace all HPS streetlights, both decorative and cobra head, by converting to LED streetlight fixtures with a control system.

The financial impact of each of these options was analyzed by City Administration. It should be noted that the business case in the Financial Matters section supports the issuance of an RFP/RFT for replacing all streetlights with LED fixtures. Should the conversion to LED streetlighting be approved, ENWIN and City Administration will continue to work together on this file to create and issue an RFP/RFT for LED conversion. Given ENWIN's current role as the operator and maintainer of the streetlight system, it is expected that ENWIN would issue the RFP/RFT for LED conversion, which would be developed in conjunction with Administration.

### **Streetlight Service Delivery Model**

As previously noted, ENWIN continues to administer the streetlighting services. This includes not only the provision of electricity, but also the regular, on-going maintenance of the streetlighting infrastructure. The City, through the Engineering Division, is responsible for larger capital investment such as relamping projects, pole replacement, local improvement requests, ornamental pole and fixture approval, etc. Engineering also reviews monthly invoices from ENWIN, responds to public concerns, and coordinates with other departments' street light concerns, i.e. Operations and Planning.

As part of Administration's review, various options for the ongoing delivery of the streetlight maintenance service were reviewed. The alternatives are listed below:

1. Status quo (maintenance currently performed by ENWIN)
2. RFP/RFT of street lighting maintenance
3. In-house management and maintenance of the streetlighting system

4. Transfer of streetlight assets to ENWIN
5. Issue a RFP for Sale of Streetlighting Asset

In all 5 options outlined above, ENWIN would retain responsibilities for electricity billing and permission to connect with the electrical distribution system.

No recommendation with regards to these is made in this report. These alternatives will be explored in a future report to assess whether further efficiencies and cost savings for both the City & ENWIN could be achieved.

#### **4. RISK ANALYSIS:**

##### ***Financial***

1. There is a financial impact as the LED street light fixture has the potential to save money for energy and maintenance, especially as energy costs increase in the future. Converting from HPS to LED will require upfront funding estimated at \$14.25 million (gross cost, not including taxes). Given that one of the options is to permanently fund this project in the Capital budget, it is important to note that the required funding is not currently in the 5 Year Capital Plan. However, the costs could be internally financed with the permanent financing coming from the annual budget savings from energy and maintenance costs.
2. There is a risk that the assumptions used in the business case model may vary from the actual results achieved after the conversion to LED is completed. The largest impact to the model would be the energy consumption savings, followed by maintenance costs, life expectancy of the fixture, and energy prices.

##### ***Safety***

1. LED lighting is brighter and casts more illumination for vehicular and pedestrian safety. Also, the advanced technology control could possibly be linked to 911-system which could be an asset to emergency personnel.
2. Streetlights will continue to be replaced on an as needed basis pending a HPS or LED relamping in order to minimize the impact of increasing bulb burnout.

##### ***Environmental***

1. The current HPS fixtures demand more energy than LED fixtures, thus the City's carbon footprint is greater which contributes to incremental greenhouse gases.
2. LED fixtures would also reduce the light pollution as the fixtures are dark-sky certified.

#### **5. FINANCIAL MATTERS:**

As noted throughout this report, several interrelated factors needed to be considered with respect to the streetlighting infrastructure. Comprehensive financial analyses were performed to look at LED conversion and related maintenance costs. Included in this analysis were consideration to capital requirements, current and future operating costs, and potential financing implications.

As with any business case contemplating various technological options, costs are subject to potential change as future business decisions could alter the base assumptions and estimates used within the analysis. For example, the current Council approved streetlight standards are more than 30 years old and the operating protocol is over 10 years old – neither of which take into account LED considerations or contemporary industry standards. As well, all costs and related

savings are subject to change over time as a result of rising fuel, asphalt, copper, and other core building and construction costs - which appear to be rising faster than the Consumer Price Index (CPI), which was the assumed inflationary rate used in this analysis for streetlight maintenance and capital costs. An inflationary cost of 5% was assumed for energy costs given recent trends in electricity rates. Also, there are grant incentives through the provincial government for energy saving conversions for LED which need to be explored with the assistance of ENWIN and LightSavers Canada, which were not included in this analysis. Working with ENWIN, the City has recently obtained a temporary provincially-funded energy analyst who is beginning to investigate the matter in consultation with ENWIN's conservation and energy management team.

Streetlight maintenance and energy cost projections were based on 2012 spending levels. Budgeted figures for streetlight maintenance have historically been lower than actuals. Therefore, while the projected savings that have been identified represent actual savings associated with the conversion to LED technology, they may not necessarily reflect the budget reduction that can be taken, and therefore both analyses have been provided below.

Finally, the analysis provided in this report assumes the conversion process takes place in 2014. The projected savings and related financing costs will be impacted should the conversion be substantially delayed.

### **LED CONVERSION**

The current 2013 operating budget for Streetlight Energy is \$3,535,119. This budget currently resides in Engineering Division and the energy portion of the budget is monitored by the Asset Planning Division. Actual Streetlight energy costs for January - December 2012 were \$3,258,198.

LED technology has advanced into the streetlight system rapidly and is the technology that we anticipate most streetlights will use in the future. We compared the business model to convert from HPS to LED based on estimated costs, pilot project data and other municipalities' experiences. To assist in confidently developing a business case and accurately provide the projected savings of converting existing HPS streetlight fixtures to LED/alternative fixtures, standards and performance requirements must be developed. It should be noted that the price of LED fixtures is declining as the demand for the fixtures has increased.

Administration investigated several models using the following factors as part of the sensitivity analysis:

1. LED fixture life cycle – 10 years, 15 years, and 20 years
2. Percentage of savings related to streetlight maintenance and energy @ 30%, 40% and 50%
3. Energy price inflation @ 3%, 5% and 7%

The projected costs and potential savings achievable under each of the various combinations of bulb life, anticipated reductions in maintenance costs, and projected energy price inflation were examined in detail. The financial impact to the Corporation as a result of converting to LED under these various models can vary significantly and it should be noted that there could be a material impact to the resulting savings if actual results vary from the model used.

**This report discusses the option using a 15-year LED fixture light, a 50% reduction in both fixed and variable maintenance costs, and an assumed 5% annual increase in energy costs, which Administration believes is the most realistic model of all scenarios contemplated.**



While the three variables noted above play a role in the projected savings for converting from HPS to LED, the most significant driver of savings is the reduced energy consumption of the LED fixtures. The energy consumption savings used in our model have been estimated to be 29%, or approximately \$22.8M over 15 years, which is consistent with the findings of the Mississauga model; however this could be considered conservative when compared to the finding of other municipalities who have also made the conversion. As with any model using projections, there is a risk that the actual reduction in energy consumption achieved after the conversion to LED may vary from the assumptions used.

In addition to the energy consumption savings risk, the model could also be impacted by the variability in the three factors identified above. As a result, that the projected savings could be more or less depending on changes to these variables.

ENWIN and its advisors at EY have indicated that the range of potential savings in this business case is consistent with their assessment.

### **Business Case**

The Operating, Capital and Financing components are explained in more detail below.

### **Operating Impacts**

While the capital outlay is significantly higher for the LED technology versus existing HPS lighting, preliminary projections indicate that there is a potential for substantial operational savings (both in terms of maintenance – approximately \$13.7M; and energy costs – approximately \$22.8M) by converting to LED technology over the estimated 15 year life of the LED fixture. Notwithstanding the capital component required, and based on the preliminary analysis completed, converting to LED could save the City approximately \$36M over the 15 year LED time horizon/life cycle in energy and maintenance costs.

The anticipated savings are a result of lower energy usage – calculated to be 29% less than current HPS bulbs based on usage data from our LED pilot locations – and assumed savings of 50% in streetlight maintenance costs. It should be noted however, that operating the system has costs that would not be eliminated by a LED relamping and maintenance would still be required for the poles and wires. The maintenance costs for non-lamp assets (e.g. poles and wires) may in fact increase over time due to the age and condition of those assets. Moving to contemporary standards and technology may also have some impact on operating costs. Many of these costs will become clearer as this project proceeds, vendors submit responses, and further assessment of the streetlight conversion is undertaken by Administration and ENWIN.

Based on Administration's analysis, and subject to the risks identified above, the summary of projected savings due to the conversion of HPS to LED fixtures is as follows:

<b>LED Conversion - Operating Impact</b>			
<b>(Assuming 15 yr life cycle, 5% CPI for energy, &amp; a reduction in variable maintenance costs of 50%, &amp; 29% energy savings))</b>			
	<b>HPS</b>	<b>LED</b>	<b>Projected Savings due to Conversion</b>
Energy Costs	\$78,462,246	\$55,637,868	\$22,824,378
Fixed Streetlight Maintenance Costs	\$12,867,449	\$7,400,242	\$5,467,207
Variable Streetlight Maintenance Costs	\$16,501,981	\$8,250,991	\$8,250,990
<b>Projected Operating Savings Achieved through conversion to LED Streetlighting</b>			<b><u>\$36,542,575</u></b>
<b>Net Present Value of Projected Savings (15 year cycle)</b>			<b>\$28,524,914</b>

The savings identified above relate to operational savings only, in both energy usage and fixed and variable maintenance costs.

It should be noted that incorporated in the operational savings calculated above is a proposed reduction by ENWIN in the fixed maintenance cost component of approximately 40% (assuming a reduction from the current fixed maintenance charge of \$750,000 annually to \$450,000 annually, upon conversion to LED). This reduction was included in the EY review done on behalf of Enwin and as such, these savings (cumulative \$4.5 million) have been factored into the above analysis.

#### **Capital Impacts and Financing Considerations**

Along with the substantial projected operating savings as a result of converting to LED, a significant capital outlay is required in order to relamp the existing streetlight infrastructure.

Historically, the City has assigned approximately \$700,000 every 5 years for HPS group relamping. As of October 31<sup>st</sup>, 2013 the available balance in this project is \$720,000, which is enough to support the current year group relamping in 2013. Given the ongoing discussions with ENWIN and the investigation of LED technology, no future funding for HPS relamping has been brought forward in the current 5 year capital plan. Should Council not approved the move to LED fixtures, funding will need to be addressed in future Capital Budget submissions if the HPS relamping is to be continued.

The capital investment to convert all our existing street lights to LED would require an initial upfront investment of approximately \$14.25 million. This investment would then be required every 15 years for group relamping of the LEDs; however it is expected that as LED technology becomes more common, prices could decline. It is important to note that the business case assumed that the existing \$720,000 earmarked for the current year relamping is used to offset the capital requirements for LED conversion, if financed internally.

If Council approves the conversion to LED lighting, procurement would be undertaken for the purchase and installation of LED streetlighting. Once the results of the procurement process are known, a more precise analysis of the funding impacts will be known; however in anticipation of conversion, Administration has explored the following options:

## FUNDING OPTIONS

- Internally funding the project from the projected streetlight energy and maintenance savings. This option would result in financing costs being incurred and may require short-term borrowing depending on cash flows or other corporate initiatives. This is the preferred method of financing.
- Alternatively, the projected annual savings could be used as a budget reduction in the operating budget with the conversion project being permanently funded from unallocated funds in the 5-year Capital Plan. This option has not been considered in this analysis.

## SUBSIDY THROUGH GRANT FUNDING

- Grant funding would also be explored in order to maximize third party funding of this initiative. As the local source for electricity conservation programming and funding, ENWIN advises that it would work with the Ontario Power Authority to secure provincial funding, where available. ENWIN has indicated in the past that grants in the amount of up to \$500,000 may be possible.

The CFO/Treasurer recommends that in all cases, the projected operating savings achieved through conversion to LED be used to fund the initial capital investment. In addition, the business case analysis continues to accumulate the annual operating savings as a funding source for future relamping costs, however how the future savings and LED relamping costs are allocated/financed is ultimately up to the discretion of Council.

The capital financing implications are outlined below:

LED Conversion - Capital Funding Analysis (Using Estimated Operating Savings as a Funding Source)		
(Assuming 15 yr life cycle, 5% CPI for energy, & a reduction in variable maintenance costs of 50%)		
Estimated Operating Savings from Conversion <sup>II</sup>		(\$36,542,577)
Projected Costs of LED Conversion	\$14,250,000	
Balance in HPS Relamping Capital Project	(\$720,000)	
<b>Total Projected Net Project Cost</b>		<b>13,530,000</b>
Additional net interest earned		(\$921,416)
<b>Net Cumulative Savings Over 15 Years</b> (represents surplus funds available after payment of initial capital investment over the 15 year life of the asset)		<b><u>(\$23,933,993)</u></b>
<b>Net Present Value of Cumulative Savings Over 15 Years</b>		<b>(\$15,877,333)</b>

<sup>II</sup> As previously noted, if the proposed fixed maintenance reduction by ENWIN in the EY analysis does not apply, the projected savings will be negatively impacted by approximately \$4.5M (not adjusted for inflation).

### **Budget Impact and Financial Considerations**

The analysis above is based on actual savings that will be realized by the City due to conversion to LED and represents actual **CASH** savings to the Corporation. However, the **BUDGET** for streetlight maintenance has historically been overspent. In addition, a proposed budget reduction of \$245,800 has been brought forward in the 2014 Operating Budget submission as administration has been working to identify various options that would allow for more efficient streetlight service delivery. This assumed acceptance of this proposed reduction has been factored into this analysis.

In order to bring the current budget in line with the projected annual operating costs outlined in the above analysis through the conversion to LED, the budget reduction that can be taken, and therefore the related funds available to designate towards the capital financing would be capped at \$1,289,821 per year, with no increase applied thereafter for inflation. This would result in a total transfer to capital over the 15 year relamping cycle of \$19,347,313. As a result, using only the savings from the presently budgeted costs to fund the capital acquisition results in the budget impacts reflected in the Table that follows. The net savings in this table are lower than those in the previous table because it only looks at savings based on what the budget currently is for this service; it does not take into account the savings from future increases in the maintenance and energy accounts that would otherwise be required without the relamping.

<b>LED Conversion - Capital Funding Analysis</b> <b>(Using Budgeted Reduction as a Funding Source)</b>		
<b>(Assuming 15 yr life cycle, 5% CPI for energy, &amp; a reduction in variable maintenance costs of 50%)</b>		
<b>Estimated Operating Budget Savings from Conversion<sup>[1]</sup></b>		<b>(\$19,347,313)</b>
Projected Costs of LED Conversion	\$14,250,000	
Balance in HPS Relamping Capital Project	(\$720,000)	
<b>Total Projected Net Project Cost</b>		<b>\$13,530,000</b>
Net Foregone Interest on Funds Used to Fund Project		\$893,229
<b>Net Cumulative Budget Savings</b> (represents surplus funds available after payment of initial capital investment over the 15 year life of the asset)		<b><u>(\$4,924,084)</u></b>

### **Cost/Benefit Analysis**

As summarized above, there is the potential for significant savings with the conversion to LED streetlights. As energy prices continue to rise, it is expected that these savings will grow in future years as a result of reduced electricity consumption. Payback is expected in approximately seven years in actual financial terms. Taking into account the current budget, actual funding of the initial capital costs (from budgetary savings) would take approximately eleven years. Upon completion of the permanent funding of the capital project, \$4.9 million would be expected to be generated in uncommitted funds that could be used for the next relamping cycle or for other purposes.

Administration recommends the conversion to LED Streetlighting, with the capital cost to be initially financed from internal cashflows, and for the project to be permanently funded through a budgeted transfer of the annual operating savings achieved as a result of the conversion.

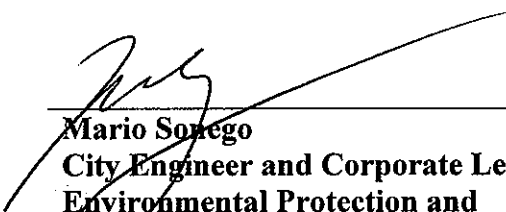
## **6. CONSULTATIONS:**

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Tiffany Pocock, Project Administrator  
Wes Hicks, Senior Manager, Infrastructure and Transportation Planning/Deputy City Engineer  
John Wolf, Manager, Traffic Operations  
Sergio Grando, Manager Real Property Asset Planning  
Steven Kriemadis, Financial Administrator – Capital Assets  
Shelby Askin Hager, Deputy City Solicitor/ Manager of Purchasing and Risk Management  
Cheryl Glassford, Legal Counsel

## **7. CONCLUSION:**

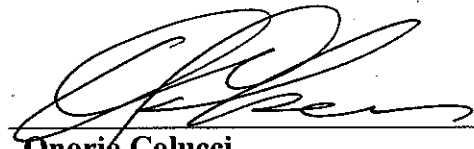
Given the significant projected savings and the environment benefits of converting the existing HPS street lights to LED fixtures, Administration recommends that the City undertake, in conjunction with ENWIN, a RFP to retrofit the existing HPS fixtures to LED fixtures throughout the city. The scope of LED conversion project will include preparing standards and requirements, and pre-qualifying services and products. It is also recommended that the required staff be assigned to provide the necessary project management for the duration of the project and that a Project Charter be developed. The cost of the project will be internally financed through the City of Windsor from the savings generated by the conversion. Furthermore, it is recommended that alternative funding sources (i.e. grants) be explored.

It is also recommended that, pending the outcome of the LED relamping RFP, all new street light installation be LED fixtures (i.e. for capital projects and new subdivision) using one of the fixtures tested by the City or ENWIN in the pilot projects. In addition, it is recommended that any new pilot project for new lighting technology, out of the right-of-way, (i.e. parks) be approved through the CAO Delegation of Authority process.




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**Mario Sonego**  
City Engineer and Corporate Leader  
Environmental Protection and  
Transportation



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**Onorio Colucci**  
Chief Financial Officer/City Treasurer and  
Corporate Leader Finance & Technology

  
for **George Wilk**  
**City Solicitor and Corporate Leader**  
**Economic Development and Public Safety**

  
for **Helga Reidel**  
**Chief Administrative Officer**

**APPENDICES:**

Appendix A – Article – Streetlight Conversion Projects Underway, November 2012 Canadian Property Management  
Appendix B – Letter From LightSavers Canada

**DEPARTMENTS/OTHERS CONSULTED:**

**Name:**

**Phone #: 519                      ext.**

**NOTIFICATION :**

Name	Address	Email Address	Telephone	FAX

energymanagement

# STREETLIGHT CONVERSION PROJECTS UNDERWAY

## Falling LED Prices Place a New Kind of High Pressure on Sodium

By Barbara Carss



**SHRINKING PAYBACK** periods for LED streetlights are helping to make the business case for large-scale conversions in many Canadian municipalities. Mississauga, a city of 740,000 in the Greater Toronto Area, is one of the most prominent examples, with plans to replace about 49,000 high pressure sodium streetlights by the end of 2014. Looking east, provincial utilities in Nova Scotia and New Brunswick are rolling out even more comprehensive conversion programs to replace the streetlights they own in towns and cities throughout those provinces.

The timing has been good for early adopters as they've watched product prices fall even in the period between beginning to investigate a switchover to LED lights and actually signing a contract. Lighting industry insiders note that prices have generally decreased from \$700 to \$800 per fixture two

years ago to the \$500-range now and they are expected to drop lower.

"It's somewhat comparable to the decision of when to buy the latest version of smartphone, but the economics make sense to start now and start realizing the energy savings," notes Kerry Jennex, Acting Director of Retail Operations with Nova Scotia Power, which currently owns approximately 85,000 streetlights slated for replacement by the end of 2019.

### DEMAND REDUCTION & COST SAVINGS

The province-wide initiative was set out in a 2011 amendment to Nova Scotia's *Energy-efficient Appliances Act* and enacted in a Regulation introduced in September 2012. Both Nova Scotia Power and municipalities like Halifax Regional Municipality (HRM) have already conducted pilot programs and been preparing more far-reaching conversions.

The Nova Scotia government projects annual savings of approximately \$5 million once all the lights have been converted.

Municipalities that own their streetlights have an extended deadline, until the end of 2022, to complete the work. The Nova Scotia government has promised low-cost financing to help municipalities cover the upfront costs, and they've also been given the option to purchase streetlights that Nova Scotia Power currently owns.

For its part of the switchover, Nova Scotia Power has forecast an approximately seven-year payback. "In a product that typically lasts for 20 years, a seven-year payback is quite good," Jennex observes.

Lights are now being replaced incrementally as they burn out. The active replacement program will begin after June 30, 2013 – the deadline set in the Regulation for municipalities to take ownership of streetlights.

In neighbouring New Brunswick, NB Power recently signed a contract for replacement of approximately 72,000 streetlights. This is the first initiative to be launched under the utility's Reduce and Shift Demand (RASD) strategy, a partnership with Siemens Canada announced earlier this year, to develop and integrate smart grid technology across the province. The overarching goal is a 635-Megawatt (MW) reduction in energy demand by 2035.

"That means pursuing every energy-saving opportunity we can identify, especially when the added value is reduced operating costs and increased environmental benefits," Gaëtan Thomas, CEO of NB Power, said when the LED streetlight contract was announced in October. "Today's announcement builds on what we have learned from a three-year pilot of LED streetlights in 40 communities around New Brunswick."

The City of Mississauga forecasts a 6 to 6.5-year payback on its new streetlights and associated wireless lighting control system.

## energymanagement

Budgeters pegged annual operating costs for the City's high pressure sodium (HPS) streetlights at about \$10.8 million by 2015, based on anticipated electricity and maintenance costs, whereas the LED lights are expected to deliver a 55% saving on energy and reduce maintenance costs by 50% to cut annual operating costs to \$4.7 million by 2015.

**CENTRAL CONTROLS**

LED streetlights' longer lifespan – approximately 50,000 hours compared to 12,500 to 24,000 for HPS – accounts for the bulk of maintenance cost savings, but the lighting control system will reduce labour costs still further. Each light will have a meter node that measures its exact energy use and transmits the information to a control centre. When a light burns out, maintenance personnel will know its exact location, eliminating the need for the nighttime spotting patrols that have traditionally conducted visual inspections by driving along major roads on a regular sixty-day schedule.

For municipalities, the lighting controls might be seen as somewhat analogous to the switch from flat-rate water charges to

metering since, typically, they pay a flat electricity rate per streetlight to their local distribution company (LDC). The meter nodes will allow for precise billing of the actual electricity used. (All other types of lighting are billed based on kilowatt-hours of consumption.)

The centralized lighting controls provide the means to tap still more electricity savings from newer bulbs, by dimming them and then adjusting them later when more light is required. "When the bulbs are new, they are about 30% brighter than when they are getting old," explains Rajan Balchandani, the City of Mississauga's Manager of Energy Management.

The conversion plan, which Mississauga Council adopted in December 2011, follows from a pilot project.

"We looked at a range of products and we looked at different manufacturers. We looked at other types of lighting as well – both LED and induction lighting," Balchandani recounts. "Based on our study, we are choosing LED and we are going with some manufacturers who were showing good performance and rates."

**MARKET DYNAMICS**

The improving economics for consumers is attributable to rapid technological advances and the number of manufacturers currently jostling for market share. As recently as 18 months ago, LED technology could generate about 80 lumens per watt. Now, output has increased to about 126 lumens per watt. Lights are brighter – often meaning that fewer actual fixtures are required.

Meanwhile, as many large lighting manufacturers move aggressively into the market, they are cutting prices for their own business logic. Proponents calling for tenders are typically getting multiple bids, often far below what they had budgeted.

"It has become such a competitive market and the pricing on everything has really come down," observes Juergen Hack, President of Ecosolutions for tomorrow, the contractor for Mississauga's streetlight lighting controls. "I think the prices are still going to come down in the next year to two years, and then they will plateau. We will get to a place where they won't drop further." ■

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December 17, 2012

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Dear Wesley:

The Canadian Urban Institute and LightSavers Canada are pleased to formally invite the City of Windsor Engineering Department to participate in an international initiative to pilot test in Canada a software tool developed by the US Department of Energy called the SEAD Streetlighting Evaluation Tool. The Tool was developed to provide a quick, easy way for municipal procurement officials and lighting specialists to evaluate the light quality, energy consumption, and life cycle cost of their LED streetlighting alternatives. An early version of the tool was presented at a workshop in Canada. We have included the Terms of Reference for this initiative.

We will be pleased to provide full support to your staff. We expect the analysis conducted with the Tool to provide a valuable way for staff to screen new products, as well as prioritize and stage future LED streetlighting retrofits.

We very much look forward to working with you and Tiffany!

Thanks very much for your consideration. Best wishes.

Sincerely yours,

Glenn Miller  
Vice President – Education and Research  
The Canadian Urban Institute

Philip Jessup, Director  
LightSavers Canada  
The Canadian Urban Institute