
FOR THE MEETING OF THE FINANCE AND ADMINISTRATION COMMITTEE
TO BE HELD ON **TUESDAY, DECEMBER 3, 2019 AT 4:00 P.M.**
IN THE **COUNCIL CHAMBER, TOM DAVIES SQUARE**

ADDENDUM (RESOLUTION PREPARED)

(Two-Thirds Majority Required to Deal with the Addendum)

DECLARATIONS OF PECUNIARY INTEREST AND THE GENERAL NATURE THEREOF

CORRESPONDENCE FOR INFORMATION ONLY

ADD-1 Report dated November 29, 2019 from the General Manager of Corporate Services regarding the LED Streetlight Conversion. 2-9
(FOR INFORMATION ONLY)

(This report provides information regarding the LED Streetlight Conversion.)

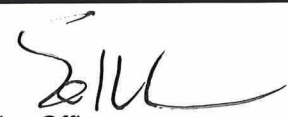
For Information Only
Finance and
Committee

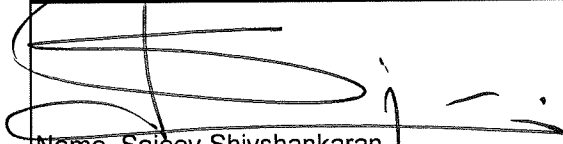

Type of Decision							
Meeting Date	December 3, 2019			Report Date	November 29, 2019		
Decision Requested		Yes	X	No	Priority		High
	Direction Only				Type of Meeting	X	Open
							Closed

Report Title
LED Streetlight Conversion

Budget Impact/Policy Implication	Resolution
<p>This report has been reviewed by the Finance Division and the funding source has been identified.</p> <p>There are no financial implications associated with this report.</p> <p>If Council approves the street lighting initiative, the financial implications are identified in the business case.</p>	For Information Only
Background Attached	Resolution Continued

Recommended by the Department
 Name Kevin Fowke Title General Manager, Corporate Services

Recommended by the C.A.O.
 Ed Archer Chief Administrative Officer

Report Prepared By	Division Review
 Name Sajeev Shivshankaran Title Manager of Energy Initiatives	 Name Shawn Turner Title Director of Assets & Fleet Services

LED Streetlights Conversion

Purpose

This report is in response to Operations Committee Resolution OP2019-30 which directs staff to prepare a report on the conversion of High Pressure Sodium (HPS) streetlights to Light-Emitting Diode (LED) streetlights including information on the AMO/LAS turnkey program.

Background

The City of Greater Sudbury owns all streetlights within the City. The electricity is provided by Greater Sudbury Utilities (GSU) and Hydro One Networks Inc. (HONI), depending on the area serviced. GSU also provides technical support and is contracted to maintain the system including the streetlight inventory database and the repair and maintenance of the streetlights. The composition of the current inventory is depicted in Table 1 below.

Table 1 Streetlight Inventory			
TYPE	GSU	HONI	Total
LED	3,000	991	3,991
HPS/LPS	6,147	4,885	11,032
Total	9,147	5,876	15,023

Of these 15,023 streetlights, 61% fall in GSU and 39% fall in HONI serviced areas. Further 3,991 have already been converted to LED from HPS.

In 2012, City Council approved a streetlight retrofit project to convert 1315 HPS to LED. Advantages of this project were a reduction in greenhouse gas emissions, reduced light

pollution and a reduction in energy use. The project also secured a \$322,175 incentive from the Ontario Energy Board (OEB).

In 2012, the Association of Municipalities of Ontario/Local Authority Services (AMO/LAS) on the request from several leading municipalities formed the partnership with RealTerm Energy to develop a turnkey program for LED Street lighting conversion. This was mainly to mitigate the confusion in the market with products and design standards. The City of Greater Sudbury was a party to the 2012 study used by AMO / LAS in establishing a cooperative purchase program amongst several large and medium sized municipalities. In 2015, the City issued an RFP to convert the remaining HPS lights to LED. The highest ranked proposal that was received was from RealTerm Energy Corporation at a bid of \$5.854 million. The Award of the RFP was not approved by Council and subsequently cancelled.

In 2019, Council declared a climate emergency and the City reaffirmed action on climate change as a strategic priority. A target of net zero greenhouse gas (GHG) emissions by 2050 was directed by Council Resolution (CC2019-151).

Use of LED Streetlights

Many Ontario Municipalities have started converting their streetlight network from HPS to LED such as Kingston, Markham, Mississauga, North Bay Timmins, Windsor, Brampton, Guelph, London, Niagara Falls, Peterborough, and Barrie. Many large municipalities in the United States have also undertaken large-scale LED conversions. However, differences in energy rates and local climate make it difficult to compare these projects.

Conversion of streetlights to LED from HPS has been performed for a variety of reasons. Table 2 below summarizes the advantages and disadvantages of LED streetlights.

Table 2 Advantages and disadvantages of LED Street lights	
Advantages of LED	Disadvantages of LED
Low energy consumption: when compared to HPS and are more efficient by 40% to 60%. Direct lighting also contributes to lower light pollution	Due to the direct lighting there is potential for inadequate coverage for sidewalk and dark patches
Reduced glare: Directing the light downward onto the roadway reduces the amount of light that is directed into driver's eyes	Luminance level higher than 10,000 cd/m ² causes visual discomfort whatever the position of the lighting unit in the field of vision
Long and predictable lifetime: The projected lifetime of LED street lights is usually 15 to 20 years, two to four times the life of HPS	The cost of LED street lighting is approximately 40%-50% more than HPS and consequently it takes several years for the payback before savings on energy are realized
Quick turn on and off: Unlike HPS, which take time to heat up once switched on, LEDs come on with full brightness instantly	In the winters there is the risk of icing and thereby requiring additional cleaning as LEDs do not produce heat as much as HPS
RoHS compliance: LEDs do not contain mercury or lead, and do not release poisonous gases if damaged unlike HPS	
Less attractive to nocturnal insects: Nocturnal insects are attracted to ultraviolet light emitted by many conventional light sources	
Optically efficient lighting equipment: Other types of streetlights use a reflector to capture the light emitted upwards from the lamp	

Current Opportunity

The City of Greater Sudbury has been preapproved for an incentive of \$564,165 by the Independent Electricity System Operator (IESO) retrofit program. The incentive is based on a per fixture rebate defined by the wattage of the bulb being replaced. The IESO

incentive is only available for streetlights converted by December 31, 2020. This incentive requires the City to complete the conversion of all or part of the remaining 11,032 HPS streetlights to LED before December 2020 in order to receive the full or pro-rata share of the incentive.

The business case for the conversion is positive and a full financial estimate can be found in "Appendix A". Table 3 below provides the summarized results.

Table 3 Streetlight Business Case			
	GSU	HONI	Total
Estimated Capital Cost	\$3,738,759	\$2,971,179	\$6,709,937
Less Rebate	\$314,351	\$249,814	\$564,165
Net Cost	\$3,424,407	\$2,721,365	\$6,145,772
Annual Energy Savings KWh	4,188,692	3,210,836	7,399,527
Annual Reduction in Hydro Costs	\$383,532	\$675,948	\$1,059,479
Payback Period After Rebate	8.9	4.0	5.8

The annual hydro costs vary between GSU and HONI, as a result of different rate structures. GSU's rate structure has a large fixed component, whereas HONI is largely a variable structure.

In summary, the City's estimates that a full conversion of the remaining HPS streetlights would result in approximately 61% energy savings that would subsequently result in approximately 41% or \$1,060,000 of monetary savings. This would result in a payback of approximately 5.8 years. The financial savings are contingent upon GSU and HONI continuing to provide electricity at similar rates into the future. Finance costs at over 7 years are included and estimated at \$670,000.

Further consideration is given to the estimated capital costs and the effect on the payback period in Table 4 below. Particularly some variables such as infrastructure replacement, availability of resources, relocation of some lighting standard due to ineffective lighting, price fluctuations as a result of exchange or capacity issues could impact the estimated capital cost in Table 3 above. This sensitivity analysis displays the payback period under different capital cost scenarios.

Table 4 Sensitivity Analysis (Payback in Years)			
	GSU	HONI	Total
Estimated Base Capital Cost	8.9	4.0	5.8
Estimated Base Capital Cost +10%	9.8	4.4	6.4
Estimated Base Capital Cost +20%	10.7	4.8	7.0

AMO/RealTerm Energy Proposal

The Association of Municipalities Ontario (AMO), through RealTerm Energy, introduced a turnkey program for streetlight conversion in 2013. AMO met with several consulting organizations to determine their ability to provide the best value to their municipal partners in relation to the complex engineering and product selection related to LED street light conversions. After evaluating several organizations abilities, AMO selected RealTerm energy as their engineering consultant and contract administrator to work on behalf of their municipal partners. To date 200 Ontario Municipalities have joined the LAS LED Street light Program.

RealTerm Energy has submitted a proposal to the City. City staff has reviewed RealTerm Energy's methodology and have spoken with staff from other municipalities who are currently using the LAS LED streetlight program. Communications with these municipalities have confirmed positive feedback with over 200,000 streetlights installed to date through this program.

RealTerm's proposal includes

- an initial assessment of the existing streetlight network
- a comprehensive Investment Grade Audit
- photometric designs to optimize energy efficiency and minimize costs
- new LED installation and recycling of old fixtures
- processing all IESO Incentive paperwork
- transfer of all inventory files and data into the GIS system
- transfer of all warranties at commissioning

RealTerm has presented a proposal for changing all the current HPS into LED for a fee. The RealTerm proposal is a "one for one" replacement of current HPS fixtures. This proposal is an estimate and may be adjusted after the investment grade audit with photometric design are complete. Further, it was completed by RealTerm without input from City staff. Due to the age of the streetlight network and past experience, staff believe there will be additional costs incurred for the replacement of electrical components throughout the system.

Conclusion

The conversion of street lighting from HPS to LED is advantageous to the City for a variety of reasons. These include lower energy consumption and operating costs, lower lighting pollution, lower GHG emissions, higher life span of LED, and will help with the Smart City ambitions as they form the basis of connectivity and data gathering and dissemination.

Appendix -A

Estimated capital cost and payback – LED conversion

Summary		
Fixtures to be Converted per Rebate		11,032
Electricity Consumption before Retrofit (kWh)		12,222,075
Estimated GSU Energy Savings (kWh)		4,188,692
Estimated Hydro One Energy Savings (kWh)		3,210,836
Total Estimated Annualized Energy Savings		7,399,527
Percentage Energy Savings (kWh)		61%
Streetlighting Annual Energy Budget (2020)	\$	2,601,000
Estimated Required Annual Energy Budget after LED Conversion	\$	1,541,521
Total Estimated Annualized Monetary Savings	\$	1,059,479
Percentage Monetary Savings (\$)		41%
Estimated Capital Cost	\$	6,719,821
Less: Rebate	\$	(564,165)
Total Project Cost	\$	6,155,656
Capital Cost per Fixture b/f Rebate	\$	609
Capital Cost per Fixture net of Rebate	\$	558
Pay-Back Period (years)		5.8
Manufacturer's Years of Operation		20.0
GHG emissions reduction Co2 eq in MT		229.4

Assumptions:

GSU and HONI have different billing methodologies; GSU has a large fixed cost component while HONI's methodology relies more on kWh, resulting in a difference in percentage savings;
2019 utility rates used
Did not include maintenance savings as this is not negotiated with GSU;