



Hamilton

INFORMATION REPORT

TO: Chair and Members Public Works Committee	WARD(S) AFFECTED: CITY WIDE
COMMITTEE DATE: October 7, 2013	
SUBJECT/REPORT NO: Outdoor Lighting Implementation (PW13075) - (City Wide)	
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SIGNATURE:	

Council Direction:

At its meeting of September 4, 2012, Public Works Committee directed staff to report on an annual basis respecting the status of the Outdoor Lighting Implementation.

Information:

The street lighting system is operating at a high level of reliability and operational efficiencies are being reviewed and implemented on an on-going basis, including the adoption of new technologies, such as LED.

Street lighting, including alleyway and pathway lighting, consists of approximately 45,000 street lights, 17,000 poles, 500 kilometres of electrical wiring, and 300 hundred power supply pedestals. Apart from City owned poles, street lights are mounted on structures (such as the underside of bridges), public and private buildings and utility owned poles. Approximately 40,000 street lights are located within Horizon Utilities Corporation's (HUC) service area and 5,000 are located in Hydro One's (HO) service area.

To date, in 2013 a total of 360 street lights have been added due to growth. The annual growth average is approximately 350 street lights. Growth is primarily driven by residential development.

Existing Infrastructure Condition:

On any given night, 99% of the street lighting system is operational which can be attributed to pro-active maintenance programming. The 1% of non-operational street lights is typically spot (non-consecutive) failures caused by routine lamp or equipment

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degradation. Larger outages do occur, but at a lesser frequency, due to non-routine failures such as underground wiring issues, storm related damage or loss of power from HUC and HO. When failures are identified, repairs are scheduled and completed to comply with the Council approved street lighting maintenance program service levels (PW07024) and the minimum maintenance standards for municipal highways (Ontario Municipal Act, regulation 239/02).

The street lighting system utilizes high pressure sodium (HPS) and metal halide (MH) lamps. 95% of the street lights contain HPS lamps and the remainder contain MH. HPS and MH lamps are relatively efficient light sources from energy consumption and maintenance perspectives. MH lamps consume slightly more electricity and require more frequent lamp replacements, however they produce a white light (HPS produces a yellow-orange colour light) which is more suited for commercial areas such as downtowns. HPS and MH technological advances have reached a plateau making it difficult for the City to realize any further operational efficiencies using the existing street lights.

The average age of HPS street lights is forty years and twenty years for MH street lights. Failures attributed to age related wear-out are increasing, particularly for the HPS street lighting infrastructure, as they are operating beyond their projected life expectancy. The increasing rate of equipment wear-out will place additional pressure on future operating budgets. The rate of increase is difficult to predict, but failure rates are being closely tracked.

Supporting infrastructure (poles, electrical wiring, and power distribution equipment) is in acceptable working order. Its age generally pre-dates HPS and MH street lights, however it has a longer projected life expectancy. A condition audit of the supporting infrastructure has never been conducted as industry inspection standards and methodologies are not well established.

In 2012, the City engaged McMaster University's civil engineering department (Infrastructure durability and sustainability) to develop an inspection protocol for City owned concrete street lighting poles. The inspection protocol is the first of its kind in the street lighting industry and utilized an innovative approach by incorporating predictive computer structural modelling and destructive laboratory testing. The completed inspection protocol provides the City with a validated and well defined methodology to assess the condition of concrete street light poles. In conjunction with the McMaster University pole inspection project, the City's existing street light pole database was re-examined and updated as various inconsistencies existed. An annual inspection program for the City's concrete street light poles is under development and once implemented will utilize the pole inspection protocol and updated pole database. Results from the inspection program will contribute to infrastructure asset management and annual capital planning processes and assist in refining future maintenance priorities.

Energy Management:

As summarized in the March 4, 2013, Information Update (Street Lighting 2013 Funding Increase Requests - ENG.13.001) street lighting energy costs are projected to continue to increase and apply pressure to the operating budget.

City staff are aggressively engaging HUC, HO and the Ontario Energy Board (OEB) and demanding to play a far greater role in reviewing street lighting energy rate setting. The objective of more City engagement is to enable more accurate cost prediction and to mitigate future regulated energy increases.

As discussed previously, existing HPS and MH street lights have reached a technological plateau and leave marginal opportunity to gain further operational efficiencies. Staff continues to investigate other strategies to increase the efficiency of the existing system, however given the limitations of the existing system (age and technology), staff are also investigating alternative street lighting options, such as LED lighting.

LED Street Lighting:

In 2009 the City began to actively investigate and pilot LED street lighting to determine if it could be a viable option to replace HPS and MH street lights. Initial testing in 2009, identified that the technology had many benefits, but its long term reliability, lack of industry standardization and high cost was prohibitive to wide-scale use. Between 2009 and 2012, LED street lighting advanced at a rapid pace and has reached a point where it can outperform HPS and MH street lights. In comparison to HPS and MH street lights, LED street lights offer the following benefits:

- Optically and energy efficient, resulting 40-50% energy consumption and longer pole to pole spacing which reduces infrastructure density.
- Projected maintenance free operating life of fifteen to twenty years, which is approximately five times longer than HPS and seven times longer than MH.
- Reduced environmental impact due to lower energy consumption and optical performance (lower light trespass and sky-glow).
- Increased controllability beyond simple on-off operation. LED street lighting, when coupled with a controls system can be dimmed from 0-100% light output.

Currently, LED street lighting has a higher initial purchase cost. Purchase prices have been dropping steadily since 2009 and will near parity with HPS and MH street lights in the very near future.

In December 2012, an RFPQ for LED street lights (C11-59-12) was issued. The purpose of the RFPQ was to pre-select LED luminaires to be used for downtown lighting improvements (250 LED luminaires will be installed as part of this project, funded 100% from downtown block funding - Downtown Renewal) and to provide a list of pre-approved LED street lights for capital construction projects. Upon the conclusion of the RFPQ, three LED street lights were pre-qualified: Cooper Navion, General Electric Evolve and Philips Lumec Roadview.

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The three pre-approved LED street lights were also added to the Standards and Approved Products list in April of 2013. Further revisions to the approved products list restricted the use of HPS and MH street lights in favour of LED street lights for new construction, inclusive of residential development.

Various Public Works capital construction projects will utilize LED street lighting including Burlington Street East reconstruction, Beckett Access reconstruction, Sanatorium Road reconstruction and Dartnall Road extension/reconstruction. Penny Lane Estates - Phase 1, which is located on the East mountain is the City's first LED lighted residential subdivision.

As discussed at the September 3, 2013, Public Works Committee meeting, the benefits and risks associated with City-wide LED conversion has been examined and a subsequent report will be brought forward by Q1 of 2014.