



Investment Grade Audit for the City of Kawartha Lakes (Fixtures Located East Side of Lindsay)

LED Streetlighting Conversion

May 24, 2018

O-0160

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REALTERM
ENERGY

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May 24, 2018

Juan Rojas
The City of Kawartha Lakes
26 Francis Street
Lindsay, ON, K9V 5R8

Dear Mr. Rojas,

We are pleased to present this Investment Grade Audit of the streetlight network located on the east side of Lindsay for the City of Kawartha Lakes. This revised IGA supersedes all previous IGA reports presented to the City of Kawartha Lakes.

We have concluded our detailed analysis of your streetlight system to reflect the proposed upgrade to LEDs based on our GIS/GPS mapping. The existing streetlights to be upgraded to LEDs under the scope of work of the IGA presented are currently consuming 308,794 kWh. By upgrading to LEDs, your projected annual energy consumption will fall substantially to 93,338 kWh, resulting in 215,456 kWh of energy savings, equivalent to 70% consumption reduction.

The total project cost is \$296,809 including allowances for rewiring, fusing, arm replacement and other installation allowances listed in Section 7.2. – Allowances. The estimated available incentives are \$44,358 from IESO.

We look forward to moving your project to the next phase. We will arrange for a conference call to discuss the contents of this report in the next few days, but until then please feel free to contact us should you have any questions.

Yours truly,



Sean Neely, President
sneely@realtermenergy.com

1. EXECUTIVE SUMMARY

Technical/ Environmental Assessment	Title	City of Kawartha Lakes LED Streetlight Conversion
	Baseline	447 HID ⁽¹⁾ Cobrahead fixtures, 1 HID Sentinel fixture 69 HID Decorative fixtures 5 HID Flood lights Total demand: 71.5 kW Annual energy consumption: 308,794 kWh Annual operating hours: 4,320
	Technology Employed	Smart ready LED Fixtures
	Technology Provider(s)	Cree, Acuity Brands, King Luminaire
	Technical Specifications	7-PIN, Smart ready fixtures Colour temp: 3,000K Average life ≥ 100,000 hours CRI ≥ 70, IP ≥ IP 65
	Fixture Warranty	10 years
	Annual Energy Savings	215,456 kWh (70%)
Financial Assessment	Financing Scheme	Capital Purchase (Kawartha Lakes-financed)
	Total Project Cost	\$296,809
	IESO Incentive	\$44,358
	Net Project Cost	\$252,451
	Average Price per Fixture	\$484
	Project Reference Period	23 Years
	Payback Period	3.9 Years
Organizational Assessment	Time Schedule	TBD

(1) – High Intensity Discharge

2. INTRODUCTION

RealTerm Energy has examined in detail the City of Kawartha Lakes' existing streetlight network records to produce this Investment Grade Audit. Our analysis included the following stages:

- Evaluate existing GPS/GIS data of the entire streetlight inventory of the City
- Apply appropriate LED-based lighting designs
 Update the replacement LED fixtures from the desktop review
 Examine in detail the City's utility bills
 Establish baseline results for energy consumption and maintenance costs
 Revise estimated project costs and savings potential

A summary of our findings is shown below:

PARAMETER	IGA RESULT
Number of Fixtures	522
Type of Fixture	HPS/MV
Energy Savings (%)	69.8%
Energy Consumption (kWh)	308,794
Projected Annual Energy Costs	\$72,689
Annual Maintenance Cost	\$14,094
Average Annual Cost per Fixture	\$166.25
Total Annual Operating Cost	\$86,783
Total Project Costs	\$296,809
Incentives (IESO)	-\$44,358
Net Project Costs <u>after</u> Incentives	\$252,451

3. GPS MAPPING

RealTerm Energy conducted a complete GIS inventory of the City of Kawartha Lakes' streetlights and used the information derived from this review to develop a detailed picture of Kawartha Lakes' current streetlighting network which includes the following:

- Accurate count of all fixtures and fixture types

Wattage of each existing fixture

Length of fixture arms, fixture heights, setbacks from roadway, pole spacing, etc.

Exact GPS coordinates

Road classifications

Utility pole ID numbers (when available)

From this data, we established a profile of Kawartha Lakes' streetlight inventory (for fixtures in Scope) and defined key parameters such as demand and energy consumption. This then allowed us to accurately estimate energy savings potential associated with the LED upgrade.

A detailed breakdown of the revised lighting inventory, obtained from the GIS/GPS audit is presented below:

3.1. GPS Inventory (Actual)

TYPE	SYSTEM WATTAGE	QTY	DEMAND (kW)
COBRAHEAD FIXTURES			
Cobrahead - HPS - 70W	100	266	26.6
Cobrahead - HPS - 100W	130	75	9.8
Cobrahead - HPS - 150W	190	83	15.8
Cobrahead - HPS - 250W	310	23	7.1
Sentinel - HPS - 250W	310	1	0.3
Subtotal (Cobrahead)		448	59.6
DECORATIVE FIXTURES			
Decorative - Victorian Lantern Post Top Type II - 100W	130	46	6.0
Decorative - Victorian Lantern Side Mount - 100W	130	14	1.8
Decorative - Victorian Lantern Post Top - 100W	130	8	1.0
Decorative - Cube Post Top - 400W	460	1	0.5
Floodlight - 250W	310	2	0.6
Floodlight - 400W	460	2	0.9
Floodlight - 1000W	1080	1	1.1
Subtotal (Decorative)		74	11.9
TOTAL		522	71.5
Notes: For simplicity, Sentinel fixtures have been categorized and Cobraheads and any Floodlights have been categorized as Decoratives.			

4. LED REPLACEMENT INVENTORY

The reduced demand following the LED streetlight upgrade will directly impact the annual energy consumption, measured in kWh. Our findings show that the demand will be reduced by 49.9 kW. This will result in energy savings of 70% over the current consumption, equivalent to 215,456 kWh annually. The table below illustrates the proposed changes to Kawartha Lakes' inventory, based on our examination of the GPS data and lighting design results (see next page for more details on our design methodology).

Following input from the Municipality, our design team developed photometric design plans utilizing 3000K colour temperature LED luminaires throughout the City.

4.1. LED Replacements (Actual, Post-Upgrade)

LDC	TYPE	WATTAGE	QTY	DEMAND (kW)	DLC*	COLOUR-TEMP.
COBRAHEAD FIXTURES						
Hydro One	33W_BXSPR-HO-HT-2ME-60W-30K-UL-SV-N-Q4	33	257	8.5	DLC	3,000K
Hydro One	33W_BXSPR-HO-HT-3ME-60W-30K-UL-SV-N-Q4	33	37	1.2	DLC	3,000K
Hydro One	38W_BXSPR-HO-HT-2ME-60W-30K-UL-SV-N-Q5	38	20	0.8	DLC	3,000K
Hydro One	43W_BXSPR-HO-HT-2ME-60W-30K-UL-SV-N-Q6	43	3	0.1	DLC	3,000K
Hydro One	43W_BXSPR-HO-HT-3ME-60W-30K-UL-SV-N-Q6	43	47	2.0	DLC	3,000K
Hydro One	55W_BXSPR-HO-HT-2ME-60W-30K-UL-SV-N-Q8	55	30	1.7	DLC	3,000K
Hydro One	62W_BXSPR-HO-HT-2ME-60W-30K-UL-SV-N-Q9	62	25	1.6	DLC	3,000K
Hydro One	62W_BXSPR-HO-HT-3ME-60W-30K-UL-SV-N-Q9	62	8	0.5	DLC	3,000K
Hydro One	88W_BXSP1-HO-HT-2ME-100W-30K-UL-SV-N-Q8	88	14	1.2	DLC	3,000K
Hydro One	88W_BXSP1-HO-HT-3ME-100W-30K-UL-SV-N-Q8	88	1	0.1	DLC	3,000K
Hydro One	107W_BXSP2-HO-HT-2ME-165W-30K-UL-SV-N-Q4	107	2	0.2	DLC	3,000K
Hydro One	125W_BXSP2-HO-HT-2ME-165W-30K-UL-SV-N-Q6	125	2	0.3	DLC	3,000K
Hydro One	143W_BXSP2-HO-HT-3ME-165W-30K-UL-SV-N-Q7	143	1	0.1	DLC	3,000K
Hydro One	88W_BXSP1-HO-HT-3ME-100W-30K-UL-SV-N-Q8, NEED 8 FEET ARM	88	1	0.1	DLC	3,000K
Subtotal (Cobrahead)			448	18.3		

Initials: _____

LDC	TYPE	WATTAGE	QTY	DEMAND (kW)	DLC*	COLOUR-TEMP.
DECORATIVE FIXTURES						
Hydro One	46W_247CL 20LEDE70 MVOLT 3K R5 DDB P7 PCLL NL	46	8	0.4	DLC	3,000K
Hydro One	39W_247CL 10LEDE10 MVOLT 3K R3 P7 PCLL HSS NL	39	45	1.8	NOT DLC	3,000K
Hydro One	39W_247CL 10LEDE10 MVOLT 3K R2 P7 PCLL HSS NL	39	1	0.0	NOT DLC	3,000K
Hydro One	40W_K601D-S-P4NL-III-40(SSL)7030-120-PR7-3K-BK	40	14	0.6	DLC	3,000K
Hydro One	79W_PSLED PK2 MVOLT FL 30K 4 GYSDP 10KVIL PER7 DLL 04 63 (TILTED 40)	79	4	0.3	DLC	3,000K
Hydro One	46W_247CL 20LEDE70 MVOLT 3K R5 DDB P7 PCLL NL Square	46	1	0.0	DLC	3,000K
Hydro One	199W_PSLED PK5 MVOLT FL 30K 4 GYSDP 10KVIL PER7 DLL 04 63 (TILTED 40)	199	1	0.2	DLC	3,000K
Subtotal (Decorative)			74	3.3		
TOTAL			522	21.6		

*DLC-listed products are LED products that have been tested at a DLC-approved laboratory and comply with specified performance and energy efficiency criteria. These products are eligible for IESO incentive. For further information please visit the DesignLights Consortium website at www.designlights.org.

The 'Not DLC-listed' products are not eligible for the IESO incentive. Please note that in the table above, two types of decorative luminaires are not eligible for IESO incentives as they are not DLC-listed. We have chosen these lights and are recommending them to you because in our professional opinion they are of equivalent quality and energy efficiency, and have the same type of independent testing as that done for DLC-listed lights. Because they are made in smaller quantities the manufacturer has simply not paid to submit them to the DLC list.

4.2. Forecasted Changes in Energy Demand

Parameter	IGA Result
Demand, baseline (kW)	71.5
Demand post-upgrade (kW)	21.6
Difference (kW)	49.9

Initials: _____

5. LED LIGHTING DESIGN

RealTerm Energy's technical evaluation team reviewed the collected geospatial dataset and formulated a hybrid approach to completing the roadway designs for Kawartha Lakes. After evaluating the configuration of each light fixture for road classification, pedestrian activity, pole spacing, mounting height, arm length and curb setback, we have concluded that Kawartha Lakes can achieve the same or better lighting levels than those under its current streetlights. We have implemented a design solution of selected LED luminaires that follows RP-8-2014 recommendations, where the recommendations are possible within the existing infrastructure configuration (RP-8 is a recommended, though not required, practice for roadway illumination).

The reason that a portion of Kawartha Lakes' luminaires do not meet RP-8 may be due to several factors, including:

- Inadequate pole spacing (poles are spaced too far apart),
Insufficient mounting height, or
Missing light fixtures (at essential locations to eliminate gaps).

Our analysis concludes that in all instances where RP-8 could not be achieved with a new LED fixture, this was already the case for the existing fixture. In such instances, photometric design has been utilized to select an LED luminaire in which the wattage and distribution pattern combine to meet or exceed the existing lighting levels.

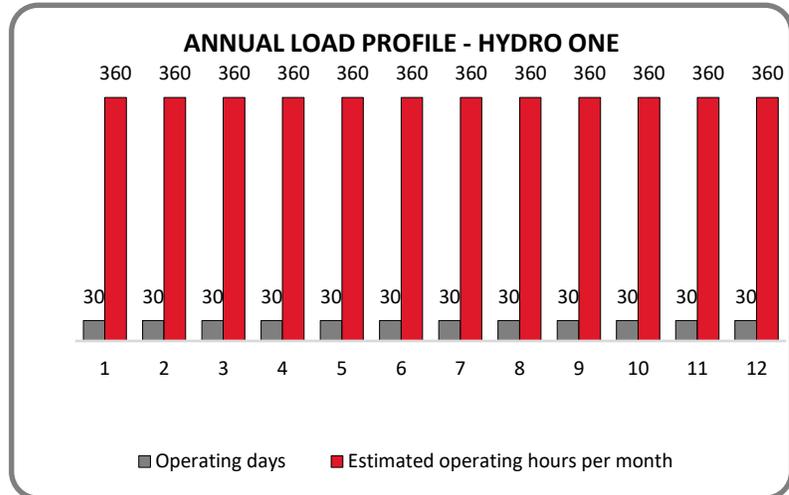
Based on the replacement luminaires detailed in the following pages, we anticipate that the impact on the City's annual energy consumption will be as follows:

Parameter	IGA Results
Current Annual Energy Consumption (kWh)	308,794
Projected LED Annual Energy Consumption (kWh)	93,338
Annual Savings (kWh)	215,456

6. ENERGY AND COST SAVINGS ANALYSIS

6.1. Hydro One's Load Profile

Streetlights are generally not metered, but rather deemed to be 'on' and are therefore billed based on a load profile, determined by the utility company. The annual load profile is a critical part of the baseline calculation, used to project the actual energy consumption and future energy savings that will be realized after the upgrade. The load profile utilized by Hydro One, Kawartha Lakes' utility company, appears on the right.

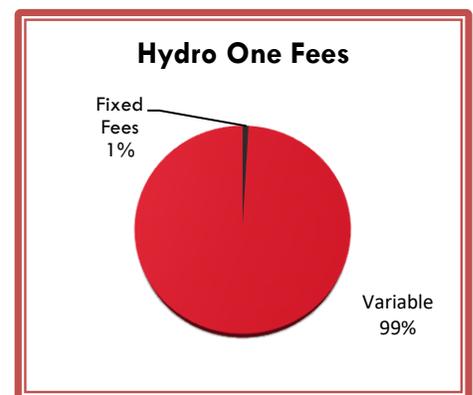


6.2. Baseline Energy Calculations

Utilities charge two types of fees: fixed and variable. Fixed fees are constant both before and after the upgrade as they are charged on a per connection basis. Variable fees are based on consumption and therefore decrease following an upgrade to LEDs. Higher fixed fees as a percentage of the total bill result in lower dollar savings potential from the upgrade due to a change in energy consumption.

In the case of Hydro One, the fixed fees are almost negligible, close to 1%. Since Hydro One has very low fixed fees, almost all the demand savings will show up in the municipality's billing.

	Fixed Fees	Variable Fees	Total Energy Cost
Baseline	\$54	\$72,635	\$72,689
Post-upgrade	\$54	\$22,088	\$22,142
Savings			-\$50,547



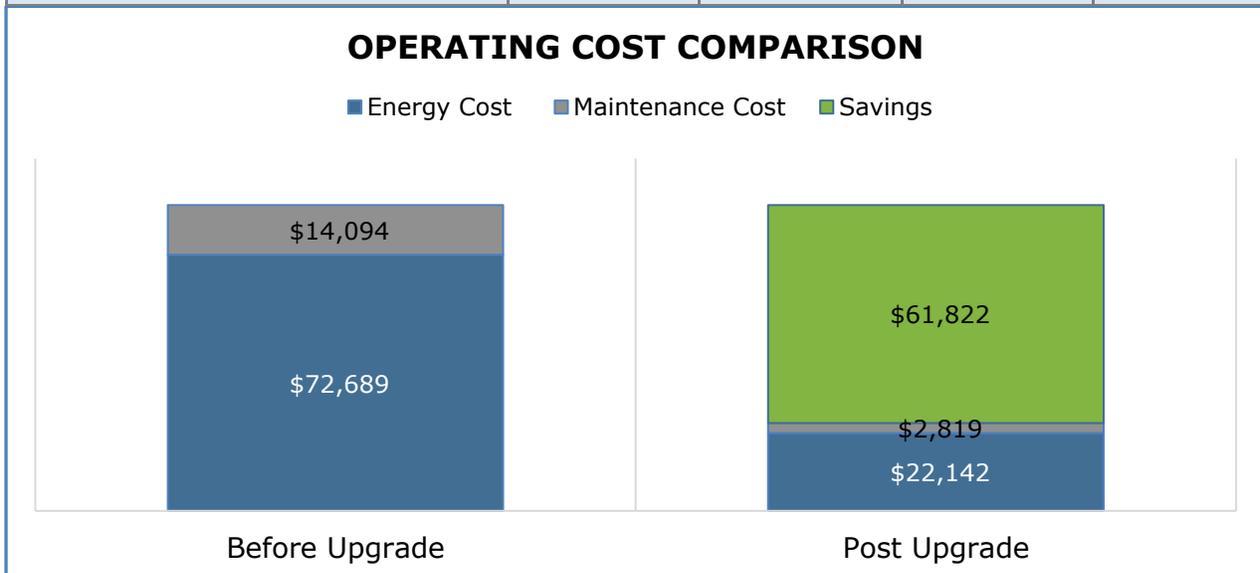
6.3. Baseline Maintenance Analysis

Based on our experience with Ontario communities of similar size and location, we have estimated current maintenance costs at \$27/fixture/year. We conservatively estimate that ongoing LED maintenance will equate to 80% savings over current HPS expenditures, or approximately \$11,275 savings in the first year. The current yearly maintenance cost is approximately \$14,094 for the portion of the streetlight system covered in this IGA, and will drop to approximately \$2,819 after the conversion.

Different manufacturers propose varying estimates for ongoing maintenance costs of LED fixtures. While it is unrealistic to assume that no annual maintenance will be required, the fixtures themselves do not contain components that require periodic replacement (such as HPS bulbs and ballasts). Although actual maintenance costs are likely to be a mere fraction of our estimate in any given year, we recommend incorporating this figure into municipal budgets to account for periodic cleaning or other eventualities over the life of the fixture and not covered under the manufacturer’s 10-year warranty.

6.4. ENERGY AND MAINTENANCE COST COMPARISON

PARAMETER	BEFORE UPGRADE	POST-UPGRADE	VARIANCE	PERCENT
Number of Fixtures	522	522		
Annual Electricity Consumption (kWh)	308,794	93,338	215,456	70%
Annual Electricity Costs	\$72,689	\$22,142	\$50,547	70%
Annual Maintenance Cost	\$14,094	\$2,819	\$11,275	80%
Total Streetlights Expenditures	\$86,783	\$24,961	\$61,822	71%
Average Annual Cost per Fixture	\$166	\$48	\$118	71%



7. PROJECT COSTS: CAPITAL PURCHASE

In a Capital Purchase financing option, or a “Design, Upgrade and Transfer”, the City arranges the financing of the project. Typically, this would be from a source similar to Infrastructure Ontario, which has low-cost interest rates.

7.1. Project Costs and Savings

PROJECT COSTS	
Number of Fixtures	522
Total Project Costs	\$296,809
Incentive	\$44,358
Net Project Costs	\$252,451
Price per Fixture	\$484

Note regarding the available incentives:

The above incentive amount is calculated using the 2016 IESO guidelines in force before June 2016 as the City has already received a preapproved amount from Hydro One. The final IESO amount is subject to Hydro One’s approval based on the quantity and the types of installed fixtures.

Initials: _____

7.2. Allowances

The total project cost includes provisional allowances as detailed below:

Provisional Items	Cobrahead		Decorative	
	%	Quantity	%	Quantity
Re-wiring	95%	425	10%	8
Re-fusing	100%	448	100%	74
Fuse Holder Replacement	100%	448	45%	33
Arm Replacement	1%	4	0%	-
Secondary Connection Refresh	30%	134	0%	-

Billing of Provisional Items

The work covered by the allowances listed above are recommended as they will minimize the likelihood of service calls over the life of the fixtures, greatly reducing maintenance costs. Following the installation phase, should fewer than the estimated provisional amounts be required (rewiring, refusing, arm replacement, etc.), the costs shall be adjusted in the final billing, based on actual work performed. During the installation phase, if additional work is required, the City will be notified first before allowances are exceeded. Any additional work must first be authorized by the municipality and will be handled as a change order.

Luminaires near high voltage wires within a restricted zone:

In the case of cobrahead fixtures located near high voltage wires within a restricted zone, we identified 3 different approaches to address and solve the issue while ensuring safety. The exact quantity of the fixtures located within the restricted zone can only be identified in the installation phase.

1. Safety is always the number one priority, and to that end, we will assess each site with the goal of relocating the affected luminaire to a safe location. This may involve the services of an engineer and additional costs imposed by Hydro One both of which will become a pass-through to the Municipality. However, we anticipate that there is a return to the Municipality through lower maintenance costs (fewer service calls) to the luminaire in the future.
2. Engage the services of high voltage crews to replace the existing luminaires. Please note, this comes at a premium price. This option is not recommended, as it does not solve any future access issues.
3. RealTerm Energy supplies the fixtures only (uninstalled), and the municipality works in conjunction with the local utilities to organize the installation.

If, during the installation, we find luminaires near high tension wires within a restricted zone, we will work with your municipal staff to determine which approach the City prefers.

8. FINANCIAL APPRAISAL OF THE CAPITAL OPTION

CAPITAL OPTION *	
Payback Period (Years)	3.9

*Payback period of the project, before including any financing costs.

8.1. Loan Costs

Infrastructure Ontario offers loans at favourable rates to most municipalities seeking to improve their civic infrastructure. Interest rates vary with market conditions and are set at the prevailing rate at the time the loan is advanced. The table below summarizes payment options that would be available to fund the project through Infrastructure Ontario. Please note, these rates change daily and are submitted below for evaluative and budgeting purposes.

CAPITAL COST*	TERM (YEARS)	INTEREST RATE	ANNUAL PAYMENT	COST OF BORROWING
\$252,451	10	3.23%	\$29,545	\$42,996

* Investment cost less IESO rebate

8.2. Net Savings After Financing Costs

Year	1	2	3	4	5	6	7	8	9	10
Annual Savings	\$61,822	\$63,564	\$65,356	\$67,199	\$69,096	\$71,046	\$73,053	\$75,118	\$77,242	\$79,427
Loan Repayment	\$29,545									
Cash Flow	\$32,277	\$34,019	\$35,811	\$37,654	\$39,551	\$41,501	\$43,508	\$45,573	\$47,697	\$49,882
Cumulative Cash Flow	\$32,277	\$66,297	\$102,108	\$139,763	\$179,314	\$220,815	\$264,324	\$309,897	\$357,595	\$407,477

We have assumed that an Infrastructure Ontario loan with an amortization term of 10 years would optimize the overall savings potential to the City.

As can be seen, there are significant savings from the outset of the project, net of financing costs.

9. CALCULATION ASSUMPTIONS

1. The electricity cost savings were calculated based on Hydro One's current rates valid at the date of the preparation of this IGA. This information can be obtained online on the Ontario Energy Board website¹. The annual energy savings were calculated based on the data collected by the GIS/GPS survey and based on the LED luminaires proposed by RTE. Any changes in the data obtained will change the energy consumption and cost savings.
2. In Ontario, all electricity rates reflect the wholesale electricity price. In the streetlight rate, the variations of the wholesale electricity prices are reflected by the Monthly Average Hourly Price and the Global Adjustment (updated monthly). In our calculation for Monthly Average Hourly Price we used \$0.01709/kWh and for Global Adjustment we used \$0.10019/kWh. These prices are the average prices of the last 12 months. The current and the historic Monthly Average Hourly Prices and Global adjustment prices are available on the IESO website².
3. We have assumed that the saveONenergy program will continue to be in effect as promised, using the currently published rates (those used for the preapproval), and that there will be no unexpected delays on the part of our partners, which would prevent us from meeting the deadline for the City to receive this incentive. While we will do everything we can to meet the requirements of this program and to gain this incentive for the City, RealTerm Energy cannot take responsibility for those aspects which are outside of its control.
4. After the first year, the energy and maintenance costs' inflation rates are 3% and 2%, respectively.
5. The final project inventory and associated energy savings are subject to change based on modifications to the scope of work (i.e. removed/added luminaires, field design changes, etc.) outlined in this IGA report and are to be confirmed in the Final Installation Report (FIR) following the completion of the project close-out. The FIR will then be used to complete the billing change to the Utility/LDC to reflect the actual installed LED inventory, which will ultimately determine the actual energy and cost savings.

¹ Ontario Energy Board. Electricity Distribution Rate Applications. Retrieved May 2018, from

<http://www.ontarioenergyboard.ca/OEB/Industry/Regulatory+Proceedings/Applications+Before+the+Board/Electricity+Distribution+Rates>

² Independent Electricity System Operator. Price Overview - Monthly Average Hourly Prices, By Year. Retrieved May 2018, from

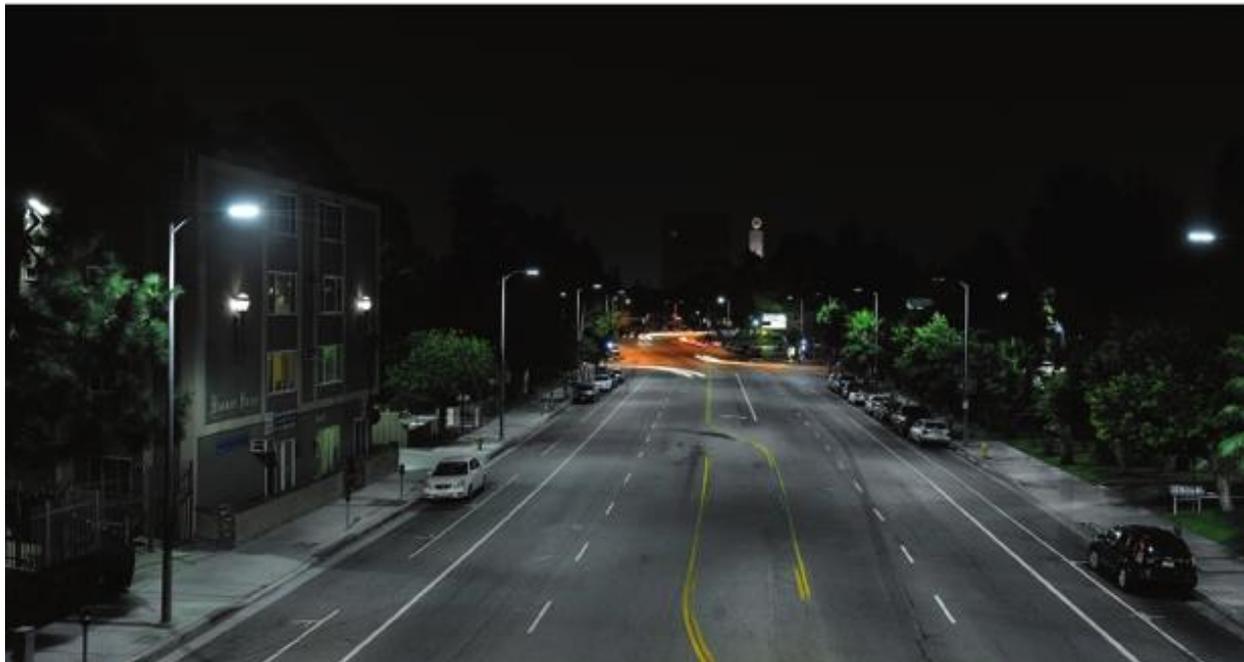
<http://www.ieso.ca/Pages/Power-Data/price.aspx>

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10. GREENHOUSE GAS REDUCTION

ESTIMATED GREENHOUSE GAS REDUCTION*	IGA Results
Current Annual Energy Consumption (kWh)	308,794
Projected LED Annual Energy Consumption (kWh)	93,338
Annual kWh Savings	215,456
Estimated Annual GHG Reduction (metric tonnes)	9
GHG Reduction over Luminaire Life (metric tonnes)	213

* GHG emissions depend on the electricity supply mix of the jurisdiction and time of use. These have been calculated using the most current, verified emissions factors found in the average emissions for 2014, released by Environment Canada in the 2016 National Inventory Report.



11. CONCLUSION AND RECOMMENDATION

We have implemented a designed solution of selected LED luminaires that follows the RP-8-2014 guidelines for as many of the streetlight locations as possible, with replacement of luminaires specified in accordance with the road classification and wattages.

This combination of LED luminaires will result in energy consumption savings of 215,456 kWh per year over the incumbent HPS fixtures, which is equivalent to 70% energy savings.

If the City of Kawartha Lakes chooses to move forward with the Design, Upgrade and Transfer option, the total project cost will be \$296,809 which includes the upgrade of some elements of the lighting infrastructure such as fuses, fuse holders, wires, davit arms and secondary connections as stated in section 7.2 - Allowances. The City should expect a payback period of 3.9 years with an IESO incentive of \$44,358.

The next steps to start the implementation of this new technology and start seeing energy and maintenance savings are as follows:

Meeting to review IGA with staff and RealTerm Energy team

Approval of the IGA

Submit IESO rebate (prepared by RealTerm, but municipal staff must submit)

Review contract to proceed with project

Sign contract.

12. TERMS AND CONDITIONS

The total project cost includes the following scope of work:

1. Data collection including GIS/GPS mapping of the existing and proposed luminaires
2. Photometric Lighting Designs
3. Remove 447 existing HID cobrahead fixtures and supply and install 447 cobrahead LED luminaires with photocell controllers
4. Remove 1 existing HID sentinel fixture, supply and install 1 cobrahead LED luminaire with a new davit arm and photocell controller
5. Remove 69 existing HID decorative luminaires and supply and install 69 decorative LED luminaires with photocell controllers
6. Remove 5 existing HID Floodlights and supply and install 5 LED Floodlights with photocell controllers
7. All provisions and allowance detailed on Section 7.2 – Allowances
8. ESA permits and inspection of work
9. Recycling of the removed HID luminaires
10. Project management
11. The Municipality GIS database will be updated once installation is complete to include final LED Inventory installed, date, type, location, etc.
12. Commissioning
13. Completing billing change(s) on your behalf based on the new LED lighting system installed by RealTerm Energy and based on the information provided by the Municipality and Utility regarding the metered and unmetered lights. RealTerm Energy assumes that the information provided by both parties are accurate and reflects the current state of the actual inventory
14. Third party quality control for a sample of 20 installed LED luminaires. Based upon this sample, should further action be required to correct any deficiencies observed in the installation, remedial work and any associated costs shall be borne by the installer
15. Applying on your behalf for the available IESO incentives. The final incentive amount will be determined by the Utility and is not guaranteed by RealTerm Energy
16. RealTerm Energy and our Installation Contractor warrant all workmanship completed within the work area for a period of one (1) year following the completion date of the installation
17. The luminaire and photocell are covered by their manufacturers' warranties for 10 and 12 years, respectively
18. This IGA is valid until August 31, 2018
19. The total project cost is in Canadian dollars and does not include the HST

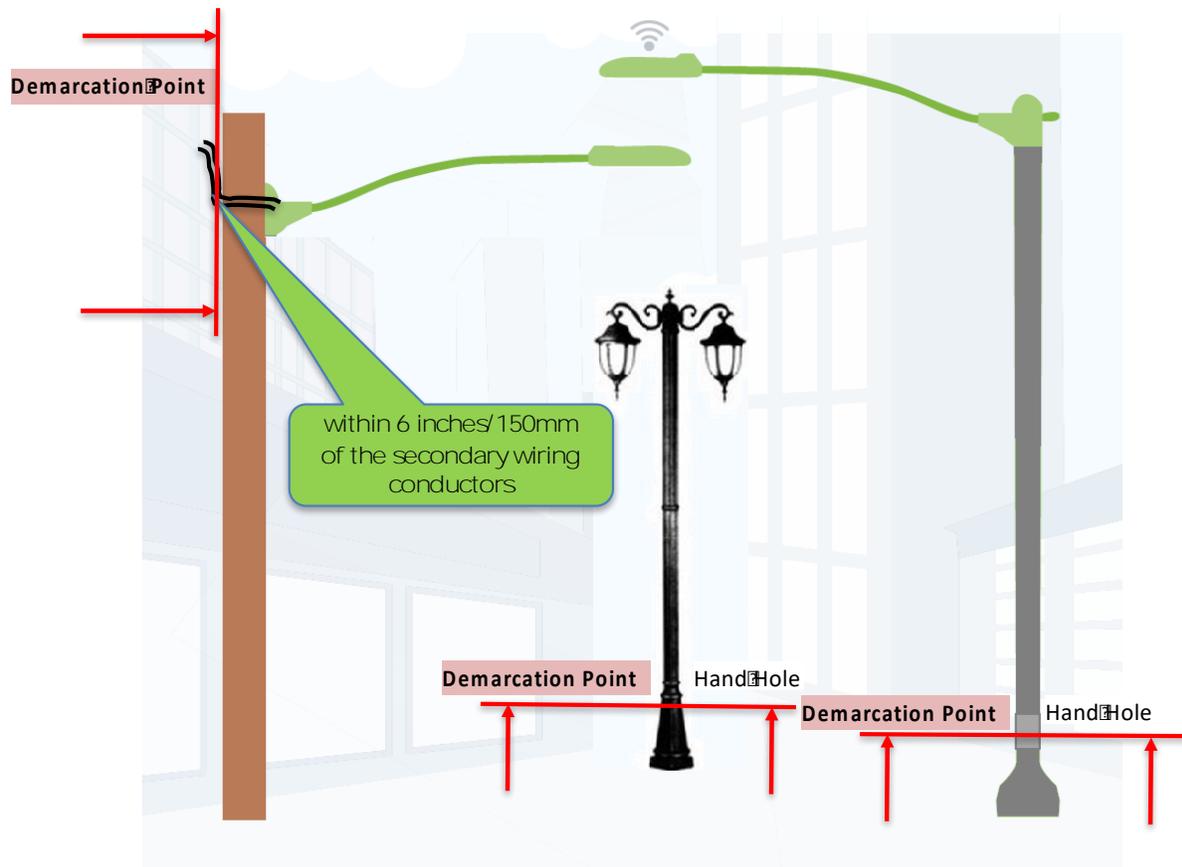
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For greater clarity, the scope of work set forth herein shall constitute the sole and entire scope of work for the Project and supersedes all prior and contemporaneous understandings, agreements, representations and warranties, both written and oral, with respect to the Project. The Parties have not relied on any statement, representation, warranty or agreement of the other Party or of any other person acting on such Party's behalf, including any representations, warranties, or agreements arising from statute or otherwise in law, except for the representations, warranties, or agreements expressly contained in this Agreement. Without limitation of the foregoing, the parties acknowledge and agree that the following items are not included in the scope of work, nor the total project cost:

1. Any cost related to upgrading your existing lighting/electrical systems to provincial and or federal standards.
2. Any cost related with the replacement of the existing relays for the group-controlled streetlights (controller box).
3. Any fees related to the connections to the secondary bus in the unlikely case that your Utility insists on charging a fee.
4. Any other fees which may be charged by a third party.
5. Any costs related to works beyond the Demarcation Point, described as follows:
 - Work performed on the electrical system by RealTerm Energy will be confined to the luminaire and an area between the agreed upon "*Demarcation Point*" (in the majority of cases a point within 6 inches/150mm of the secondary wiring conductors) on what is referred to as the "tail". This is the location at which a fuse and fuse holder should exist and acts as a disconnect to allow easy service, protect the new luminaire and wiring from voltage surges and provide a safe working environment. In the event that a fuse and fuse holder do not exist, they will be installed.
 - For decorative poles and stand-alone underground-fed units the "*Demarcation Point*" is located at the base of the pole in the "Hand Hole". Where overhead feeds are in use, the "*Demarcation Point*" is located at the base of the arm holding the fixture, where the connection is made to the secondary wires.
 - If RealTerm Energy dispatches a maintenance contractor and the required repairs are outside of the work areas, we will recommend a solution and communicate this information to the Client for approval before proceeding.

Initials: _____

13. SCOPE OF WORK DIAGRAM



The foregoing excluded items and any other items not included within the scope of work may be provided by RealTerm Energy at an additional cost pursuant to a separate written agreement or amendment between the parties only. The above list of exclusions is not meant to be exhaustive, as network site conditions vary, and shall not operate in any way to limit the exclusions of this paragraph or imply any obligation or duty on the party of RealTerm Energy to complete any work other than the specifically defined scope of work set forth herein.

Juan Rojas
The City of Kawartha Lakes
26 Francis Street
Lindsay, ON, K9V 5R8

The information contained herein will form part of the Installation contract documents as well as the Scope of Work for the LED Streetlighting conversion project. The undersigned is authorized to sign on behalf of the municipality and accepts the terms and conditions of this Investment Grade Audit O-0160_Kawartha Lakes_ON_IGA-2018-05-24.

Please review and acknowledge by initializing the following sections:

- LED REPLACEMENT INVENTORY (Page 7-8)
- PROJECT COSTS & CAPITAL PURCHASE (Page 12)
- CALCULATION ASSUMPTIONS (Page 15)
- TERMS & CONDITIONS (Page 18-19)

Authorized Signature

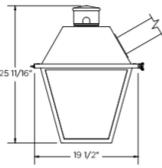
Name (please print)

Title (please print)

Date

APPENDIX A: SITE SPECIFIC FIXTURE REPLACEMENTS

Type	Qty.	Replacement	Before	After
Cobrahead	427	Cree BXSPR_HO		
Cobrahead	15	Cree BXSP1_HO		
Cobrahead	5	Cree BXSP2_HO		
Sentinel	1	Cree BXSP1_HO		
Floodlight	5	PSLED Acuity Brands		

<p>Victorian Post Top Lantern</p>	<p>54</p>	<p>247CL Acuity Brands</p>		
<p>Decorative Cube Post Top</p>	<p>1</p>	<p>247CL Acuity Brands</p>		
<p>Decorative - Victorian Lantern Side Mount</p>	<p>14</p>	<p>K601D King Luminaire</p>		

Note: The above sample images are for illustrative purpose only.

APPENDIX B: LUMINAIRE SPEC SHEETS

The Luminaire Spec Sheets are attached in a separate electronic file.

APPENDIX C: LUMINAIRE PRODUCT WARRANTY

The Luminaire warranty documents are attached in a separate electronic file.

APPENDIX D: LIGHTING DESIGN LAYOUTS

The designs of the proposed LED luminaires are attached in a separate electronic file.

APPENDIX E: WARRANTY SERVICE AGREEMENT

The Warranty Service Agreement is attached as a separate electronic file. The Municipality will be required to sign it.

APPENDIX F: STANDARD CONTRACT

The standard contract document is included as a separate electronic file.