



Ottawa's transition to

LED STREETLIGHTS

Retrofitting up to

58,000 streetlights

Throughout Ottawa

A streetlight revolution is currently underway in Ottawa: throughout the city, old high pressure sodium and metal halide streetlights are gradually being replaced by new and more energy efficient Light Emitting Diode (LED) lights.

"The LED project, with its dimming and asset management functionality, will provide the City with significant financial savings from the reduced energy consumption and also from reduced maintenance requirements"

- Roger Marsh, Chief Energy Services Officer at Energy Ottawa.

4 Energy Ottawa is providing a turnkey solution to the City of Ottawa for the 4-year joint project

66 Only 1.5 years into project, new streetlights are averaging a reduction in consumption of 66%

1 INTRODUCTION

Initiated in February 2016, this project is a partnership between the City of Ottawa Transportation Department and Energy Ottawa, a subsidiary of Hydro Ottawa. For the City of Ottawa, this partnership project aligns with the Building Engineering and Energy Management (BEEM) Unit's Energy Management and Investment Strategy^[2] of the City's 2015-2018 Strategic Plan^[3], focusing specifically on reducing the electricity consumption of their streetlight network.

In 2014, streetlights accounted for 17% of the City's total electrical use, at an annual cost of \$7.2 million^[4].

2 PROJECT DETAILS

Energy Ottawa (working with a number of private sector partners) is in charge of installing the new LED lighting over the course of the 4-year project horizon, from 2016 until 2020^[5], as well as carrying out all necessary maintenance over the coming 6-10 years^[6]. At the start of the project, the priority was on identifying and replacing those streetlights with the highest energy consumption and/or highest wattage, before moving on to the remainder of the network. In total, the City has around 72,000 streetlights and this project will replace up to 58,000 of them with LEDs^[4]. Decorative lights are not included in this phase of the project due to their higher fixture cost and thus longer payback period.

An often overlooked, but particularly noteworthy feature of this project is its financing structure. The total cost of the streetlight replacement work is estimated at \$32.6 million^[7] (\$31.4 million in project costs + 3% financing costs)^[6]. Energy Ottawa approached the City of Ottawa back in 2014 with a proposal: the utility would design, install, finance and maintain every aspect of the replacement project. With an expected payback period of 6 years^[6], the realized cost savings for these first 6 years would go towards paying off the costs of the project, before subsequently going to the City of Ottawa to allocate to other areas of the budget.

3 RESULTS

At the start of the conversion project, it was estimated that switching to LEDs would reduce energy consumption by an estimated 50%^[6]. As of the end of 2017, a year and a half into the project, average energy savings of 66% are being documented! This gain in efficiency will save the City of Ottawa approximately \$4 million in utility costs annually when the project is complete (equivalent to removing 2,500 homes from the electricity grid)^[5], as well as decreasing CO₂ emissions by 1,000 tonnes every year^[8].

There are a number of other reasons supporting this decision to transition to LED lights. Not only is the typical lifespan of LED lights 4 or 5 times longer than that of other light types with 50% lower maintenance costs, but the LED fixtures have built-in sensors that notify maintenance when a light has failed, thereby reducing down-time. Furthermore, controls within the new lights give system managers the ability to record actual consumption data, as well as support usage-based billing. Additionally, each light can be customized to offer the optimum illumination levels for each individual street location^[4]. This has contributed in part to the greater than expected cost savings to date: in the past, certain areas were overlit due to the one-size-fits-all nature of the older streetlights.

These new dimmable lights allow a wide range of dimming options and thus enable energy conservation where less light is needed.

While the energy efficiencies and emission reductions of LED technology are difficult to argue with, critics of LED street lighting in Ottawa point to a recent report from the American Medical Association where some negative impacts of LED lighting were presented: high intensity residential nighttime lighting, such as bright LEDs, can disrupt the circadian rhythms of nearby residents and has been associated with poor sleep, obesity and impaired daytime functioning^[9,10]. The City of Ottawa has taken steps to address these concerns by ensuring that the newly installed LED fixtures are calibrated to have similar colour temperatures to the old fixtures^[4], with lights on residential roads having a warmer colour temperature than those on main arteries^[7].

4 CONCLUSIONS & REFLECTIONS

As of the end of 2017, Energy Ottawa proudly reports that the project is on-time and on-budget. The 20,000th streetlight was replaced during October 2017, and so far public sentiment towards the project has been favourable, with mostly positive/neutral feedback. (Roger Marsh, Chief Energy Services Officer at Energy Ottawa, confirms that the public treating changes like this as a non-event is in fact just the outcome one hopes for). Looking to the future, the project is on track to have all 58,000 fixtures converted to LED fixtures by 2020, and is perhaps even running a little ahead of schedule^[6].



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