



**CITY OF HAMILTON**  
**PUBLIC WORKS DEPARTMENT**  
**Corporate Assets and Strategic Planning Division**

<b>TO:</b>	Chair and Members Public Works Committee
<b>COMMITTEE DATE:</b>	September 8, 2016
<b>SUBJECT/REPORT NO:</b>	Energy Efficiency Projects Funding (PW16074) (City Wide)
<b>WARD(S) AFFECTED:</b>	City Wide
<b>PREPARED BY:</b>	Frank Gazzola Superintendent of Energy Engineering 905-546-2424, Extension 7518  Tom Chessman Manager of Energy Initiatives 905-546-2424, Extension 2494
<b>SUBMITTED BY:</b>	Geoff Lupton Director, Energy, Fleet & Facilities Public Works
<b>SIGNATURE:</b>	

**RECOMMENDATION**

- (a) That the City of Hamilton proceed with the implementation of the Energy Efficiency Projects outlined in this report, at an estimated capital cost of \$3,147,000;
- (b) That the estimated project costs of \$2,472,000 be funded from the Enterprise Fund Reserve (112243);
- (c) That the energy savings from the projects funded in item (b) be used to repay the funds borrowed, plus applicable interest, to the Enterprise Fund Reserve (112243);
- (d) That the estimated project costs of \$615,000 be funded from the Energy Fund Reserve (112272);
- (e) That the energy savings from the projects funded in item (d) be used to repay the funds borrowed, plus applicable interest, to the Energy Fund Reserve (112272);
- (f) That the budgets for the various sites where these projects are implemented be reduced by the Annual Energy Savings Amount in the year following payback, as indicated in Appendix A to Report PW16074;
- (g) That the estimated project costs of \$60,000 for the Macassa Lodge Building Automation System be funded from the Energy Fund Reserve (112272).

## **EXECUTIVE SUMMARY**

The purpose of this report is to request approval from Council to borrow funds to implement various energy efficiency projects that will reduce the City's energy consumption and costs as well as contribute to a reduction in the City's overall Green House Gas (GHG) emissions. These initiatives will reduce energy costs by approximately \$482,500 per year and will qualify for incentives, estimated to be in the amount of \$451,700. The total amount of funds required is \$3,147,000. Of that amount, \$2,472,000 is intended to be funded by the Enterprise Fund Reserve (112243) and \$675,000 is intended to be funded from the Energy Fund Reserve (112272). Staff recommends that the monies borrowed from the Enterprise Fund Reserve and Energy Fund Reserve be repaid through each project's resulting energy savings with the exception of the Macassa Lodge Building Automation System (BAS) project. The year following completion of the capital and interest payments, site budgets will be reduced by the Annual Energy Savings amount for that specific project as noted in Appendix A to Report PW16074.

The BAS project will be funded directly from the Energy Fund Reserve, with no repayment required for the estimated project cost of \$60,000. This is recommended as over \$200,000 was recovered from a separate billing and rate recovery process. This \$60,000 capital project is used in part to direct funds back to the client group. This process leverages the recovered funds and allows staff to recover additional incentives and further energy savings as a result of the recommended project.

Overall project specific details are outlined in Table 1 below, which shows estimated costs, estimated annual savings, estimated incentives and simple payback both with and without incentives. More detail is found in Appendix A to Report PW16074. Please note figures have been rounded to nearest hundredth.

All of these projects are in line with the goals and objectives of the City of Hamilton's Corporate Energy Policy, Vision 2020 and Strategic Plan in terms of contributing to achieving the City's goals of energy and GHG emission reductions by 2030.

As per the Corporate Energy Policy, all incentives will be deposited in the Energy Fund Reserve (112272). Capital cost repayment will include applicable interest charges at the time funds are drawn from reserves. See Appendix A to E to Report PW16074 for the individual repayment schedule and site listings.

Many of the projects are upgrading the lighting from a fluorescent light source to a Light Emitting Diode (LED) light source. The LED offers 40-60% lower energy use, significant longer lamp life (over 50,000 hours as compared to 20,000 hours for standard fluorescent) which means fewer lamp changes and excellent colour rendition characteristics.

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Table 1 – Project Specific Detail

Facility	Estimated Project Cost	Estimated Annual Energy Savings	Estimated Incentives	Payback without Incentives (Years)	Payback with Incentives (Years)
Hamilton Place LED Lighting	\$590,000	\$75,000	\$115,000	7.87	6.33
First Ontario Centre LED Lighting	\$530,000	\$65,000	\$77,000	8.15	6.97
Fire Stations LED Lighting	\$215,000	\$36,000	\$52,000	5.97	4.53
Parkdale Arena & Morgan Firestone Arena Low-E Ceilings	\$90,000	\$30,000	\$30,000	3.00	2.00
Aquatic Centres Exterior LED Lighting	\$106,000	\$10,000	\$6,400	10.60	9.90
Valley Park Aquatic Centre LED Lighting	\$220,000	\$30,000	\$21,000	7.33	6.63
Ice Arena LED Lighting	\$1,221,000	\$205,000	\$124,000	5.96	5.35
Olympic Arena Infra-red Heater	\$25,000	\$3,500	\$3,500	7.14	6.14
Dundas Lion's Memorial Community Centre LED Lighting	\$25,000	\$9,000	\$8,000	2.78	1.89
Macassa Lodge Building Automation System (BAS) Upgrade	\$60,000	\$9,000	\$6,000	6.67	6.00
Ancaster Senior Achievement Centre Lighting	\$40,000	\$6,000	\$5,000	6.67	5.83
Sackville Hill Recreation Centre Exterior Lighting	\$25,000	\$4,000	\$3,200	6.25	5.45
Totals	\$3,147,000	\$482,500	\$451,700	6.52	5.59

**Alternatives for Consideration – See Page 9**

## **FINANCIAL – STAFFING – LEGAL IMPLICATIONS**

### **Financial:**

The submission of these projects offers a significant return to the City of Hamilton and will be completed and paid off in aggregate by 6.52 years or 5.59 years, when including the incentives.

These initiatives will reduce energy costs by approximately \$482,500 per year and will qualify for incentives, estimated to be in the amount of \$451,700. The total amount of funds required is \$3,147,000. Of that amount, \$2,472,000 is intended to be funded by the Enterprise Fund Reserve (112243) and \$675,000 is intended to be funded from the Energy Fund Reserve (112272). Staff recommends that the monies borrowed from the Enterprise Fund Reserve and Energy Fund Reserve be repaid through each project's resulting energy savings with the exception of the Macassa Lodge Building Automation System (BAS) project. The year following completion of the capital and interest payments, site budgets will be reduced by the Annual Energy Savings amount for that specific project as noted in Appendix A to Report PW16074.

The BAS project will be funded directly from the Energy Fund Reserve, with no repayment required for the estimated project cost of \$60,000. This is recommended as over \$200,000 was recovered from a separate billing and rate recovery process. This \$60,000 capital project is used in part to direct funds back to the client group. This process leverages the recovered funds and allows staff to recover additional incentives and further energy savings as a result of the recommended project.

Project specific details are outlined in Table 1 above, which shows estimated costs, estimated annual savings, estimated incentives and simple payback both with and without incentives. More detail is found in Appendix A to Report PW16074. Please note figures have been rounded to nearest hundredth.

As per the Corporate Energy Policy, all incentives will be deposited in the Energy Fund Reserve (112272) and with the exception to the Macassa Lodge BAS project, the capital funds borrowed an interest will be repaid through the annual energy dollar savings as per Appendix A to Report PW16074.

### **Staffing:**

There are no staffing revisions required to implement the listed projects.

### **Legal:**

There are no legal implications as a result of the recommendations in the report being approved.

## **HISTORICAL BACKGROUND**

### Hamilton Place LED Lighting

The project includes the improvement of the light sources and dimming capabilities of the performance venues (stages). These improvements will allow the facility to

accommodate larger, more demanding touring performances by providing them with higher quality lighting. The opportunity to modernize the lighting system and reduce electrical costs through the proposed LED upgrade offers an attractive opportunity for re-investment in this facility.

The installation of LED lighting is estimated to cost \$590,000, while qualifying for an estimated incentive in the amount of \$115,000 effectively reducing the project cost to \$475,000. The project will generate operations savings in the amount of \$75,000 annually based on current operating levels and run hours. These savings will produce a project payback in 6.33 years.

#### First Ontario Centre LED Lighting

The First Ontario Centre presents an excellent opportunity for owners and site operators to reduce operating costs, enhance the ice surface lighting, and modernize the facility's lighting system through a LED lighting system upgrade. The feasibility of such an upgrade has been tested using an industry leading LED lighting system provider as a base solution from which these findings have been deduced. An LED based retrofit system is recommended for its various benefits over metal halide and similar High-Intensity Discharge lighting technologies. Benefits of LED include dimming, instant on/off, long life, high efficiency and the potential for providing patrons with an improved entertainment experience. Efficiencies of the proposed LED system allow for light levels and metrics to be improved while power use is reduced from existing levels.

The installation of LED lighting is estimated to cost \$530,000, while qualifying for an estimated incentive in the amount of \$77,000 effectively reducing the project cost to \$453,000. The project will generate operations savings in the amount of \$65,000 annually based on current operating levels and run hours. These savings will produce a project payback in 6.97 years.

#### Fire Stations LED Lighting

This project addresses indoor lighting that in some cases, is required to remain on 24 hours a day at certain Hamilton Fire Stations using LED lighting systems to reduce energy consumption and cost and by utilizing lighting control systems where appropriate.

The installation of LED lighting is estimated to cost \$215,000, while qualifying for an estimated incentive in the amount of \$52,000 effectively reducing the project cost to \$163,436. The project will generate operations savings in the amount of \$36,000 annually based on current operating levels and run hours. These savings will produce a project payback in 4.53 years. Savings and repayment schedule is found in Appendix B to Report PW16074. Please note figures have been rounded to nearest hundredth.

#### Morgan Firestone Arena and Parkdale Arena Low E Ceilings

To reduce energy consumed by the ice making refrigeration equipment in these high use arenas, this project proposes to install a low emissivity ceiling at Morgan Firestone Arena and Parkdale Arena's newer ice sheet. The installation of a low emissivity ceiling

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prevents thermal radiation from being transmitted from the warmer arena ceiling to the ice sheet surface below, therefore saving cooling energy and costs while improving ice conditions and quality. This system is currently installed at all other City of Hamilton arenas for the same reasons.

The installation of LED lighting is estimated to cost \$90,000, while qualifying for an estimated incentive in the amount of \$30,000 effectively reducing the project cost to \$60,000. The project will generate operations savings in the amount of \$30,000 annually based on current operating levels and run hours. These savings will produce a project payback in 2.00 years. Savings and repayment schedule is found in Appendix C to Report PW16074. Please note figures have been rounded to nearest hundredth.

#### Aquatic Centres Exterior LED Lighting

The exterior lighting systems at various City of Hamilton Aquatic Centres presents an opportunity to reduce operating costs, enhance safety and modernize the facilities appearance by converting to LED lighting exterior systems. This project will reduce energy consumption and costs while improving lighting levels and appearance for exterior building and parking lot LED lighting.

The installation of LED lighting at 10 City of Hamilton Aquatic Centres is estimated to cost \$106,000, while qualifying for SaveONenergy estimated incentive in the amount of \$7,000 effectively reducing the project cost to \$99,000. The project will generate estimated operations savings in the amount of \$10,000 annually based on current operating levels and run hours. These savings will produce a project payback in 9.90 years. The detailed savings and repayment schedule is found in Appendix D to Report PW16074. Please note figures have been rounded to nearest hundredth.

#### Valley Park Aquatic Centre LED Lighting

Valley Park aquatic centre is a high use facility with a good case for upgrading the lighting to more energy efficient systems. To maximize energy savings, LED lighting systems will be employed where appropriate and will comply with all light level requirements.

The installation of LED lighting is estimated to cost \$220,000, while qualifying for an estimated incentive in the amount of \$21,000 effectively reducing the project cost to \$199,000. The project will generate operations savings in the amount of \$30,000 annually based on current operating levels and run hours. These savings will produce a project payback in 6.63 years.

#### Arenas LED Lighting

There are 17 Ice Arenas in the City of Hamilton that have a mix of lighting systems that when converted to LED will reduce operating costs significantly and enhance the functionality and appearance of each facility. Lighting upgrades are being recommended in the change rooms and offices at each facility and for the 19 ice surfaces.

The installation of LED lighting is estimated to cost \$1,221,000, while qualifying for SaveONenergy rebate incentive estimated to be in the amount of \$124,000 effectively reducing the project cost to \$1,097,000. The project will generate estimated operations savings in the amount of \$205,000 annually based on current operating levels and run hours. These savings will produce a project payback in 5.35 years. Savings and repayment schedule for this project is found in Appendix E to Report PW16074. Please note figures have been rounded to nearest hundredth.

#### Olympic Arena Infra-red Heater Conversion

This is a well proven measure that will reduce electrical energy consumption and cost by replacing inefficient electrical infra-red heaters over the seating area with efficient clean burning natural gas infra-red heaters. New controls will provide increased spectator comfort and facilitate their use for arena operators.

The installation of natural gas infra-red heaters is estimated to cost \$25,000, while qualifying for an estimated incentive in the amount of \$3,500 effectively reducing the project cost to \$21,500. The project will generate estimated operations savings in the amount of \$3,500 annually based on current operating levels and run hours. These savings will produce a project payback in 6.14 years.

#### Dundas Lion's Memorial Community Centre LED Lighting

At the Dundas Lions Memorial Community Centre there is an excellent opportunity to replace existing old high intensity discharge (HID) lighting in the gym areas, service area lighting and outside lighting with new high efficiency LED sources. The resulting project will provide improved light levels, excellent colour rendering, plus uniform and consistent light levels throughout the facility.

The installation of LED lighting is estimated to cost \$25,000, while qualifying for an estimated incentive in the amount of \$8,000 effectively reducing the project cost to \$17,000. The project will generate operations savings in the amount of \$9,000 annually based on current operating levels and run hours. These savings will produce a project payback in 1.89 years.

#### Macassa Lodge Building Automation System (BAS) Upgrade

The existing BAS (Building Automation System) does not have the capability to operate the chillers in a straightforward and efficient manner. BAS requires upgrading to allow for improved operation and reduce energy consumption and costs.

Upgrading the Macassa Lodge Building BAS will provide expanded control over the chilled water system and would provide monitoring and control of all critical operating parameters and set points, therefore it will provide the ability to run the chillers in the most optimum configuration while also enhancing sequencing and control of all the chillers.

Funds recently recovered from billing errors were deposited in the Energy Fund Reserve, as per the Corporate Energy Policy. The capital required for this project is being redirected back to Macassa Lodge as per the recommendations.

The BAS upgrade is estimated to cost \$60,000, while qualifying for an estimated incentive in the amount of \$6,000 effectively reducing the project cost to \$54,000. The project will generate operations savings in the amount of \$9,000 annually based on current operating levels and run hours. These savings will produce a project payback in 6.0 years.

#### Ancaster Senior Achievement Centre

The Ancaster Senior Achievement Centre is a facility that provides a comfortable and friendly atmosphere for older adults to increase social contacts, attain new knowledge, participate in recreational activities and find opportunities to achieve a total sense of well-being. Programs include dance, exercise, crafts, music, socials, cards and several drop-in activities.

The gym and multi-purpose room still have original building lighting that is of poor quality and the facility has received comments from patrons on how inefficient and low quality the lighting is. An LED retrofit at the senior's centre will provide reduced maintenance and operating costs while enhancing safety, lighting quality and modernizing the facility lighting.

The installation of LED lighting is estimated to cost \$40,000, while qualifying for an estimated incentive in the amount of \$5,000 effectively reducing the project cost to \$35,000. The project will generate operations savings in the amount of \$6,000 annually based on current operating levels and run hours. These savings will produce a project payback in 5.83 years.

#### Sackville Hill Recreation Centre Exterior Lighting

Sackville Hill is a senior's recreation centre for the delivery of leisure programs and services. While the facility has recently received upgrades, area improvements are required for the current exterior lighting systems as concerns have been expressed with the parking lot lighting levels in terms of safety for patrons. An LED lighting upgrade presents the perfect solution to bring the lighting up to safe and comfortable levels while enhancing the aesthetic quality of this facility and in addition will provide reduced maintenance and reduced operating costs due to lower energy consumption.

The installation of LED lighting is estimated to cost \$25,000, while qualifying for an estimated incentive in the amount of \$3,200 effectively reducing the project cost to \$21,800. The project will generate operations savings in the amount of \$4,000 annually based on current operating levels and run hours. These savings will produce a project payback in 5.45 years.

### **POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS**

Not Applicable.



## **RELEVANT CONSULTATION**

The Divisions with facilities impacted by these projects have been consulted, including front line staff where appropriate. These include:

- Corporate Finance;
- Corporate Facilities Management – Fire, Lodges, Recreation;
- CORE (First Ontario Centre).

Proposals have been created to assess installation options and technology options. Associated incentives have been reviewed with utility staff (Horizon, Hydro One and Union Gas).

## **ANALYSIS AND RATIONALE FOR RECOMMENDATION**

Funding is required to install energy efficient LED lighting systems and equipment which will reduce operating costs and reduce Green House Gas emissions as per the Corporate Energy Policy.

### Financial Considerations:

Total Project Costs	\$3,147,000
Energy Savings (annual)	482,500
Incentives	451,700
Combined Simple Payback (with incentives)	5.59 Years

A ten year accumulated savings of \$5,276,700 would be realized from these projects, including incentives.

## **ALTERNATIVES FOR CONSIDERATION**

Performing these projects will align with existing Corporate Energy Policy that speaks to lower energy intensity in corporate buildings and lower Greenhouse Gas Emissions (GHG's). If this project work is not completed, operating budgets will increase from higher electrical and natural gas costs. With rate increases expected to impact future year budgets, these projects mitigate the higher energy costs by lowering overall consumption.

## **ALIGNMENT TO THE 2016 – 2025 STRATEGIC PLAN**

### **Clean and Green**

*Hamilton* is environmentally sustainable with a healthy balance of natural and urban spaces.

## **APPENDICES AND SCHEDULES ATTACHED**

Appendix A – Project Repayment Schedule

Appendix B – Fire Stations Interior Lighting Upgrade Project

Appendix C – Morgan Firestone and Parkdale Arenas – Low Emissivity Ceilings Project

Appendix D – Aquatic Centres Exterior Lighting Project

Appendix E – Arenas – Energy Efficient LED Lighting Project

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