



CITY OF HAMILTON
Public Works Department
Corporate Assets and Strategic Planning Division

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	September 2, 2014
SUBJECT/REPORT NO:	Funding Request for Energy Efficiency Projects (PW14097) - (City Wide)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Tom Chessman, Manager Energy Initiatives (905) 546-2424, Extension 2494
SUBMITTED BY:	Gerry Davis, CMA General Manager Public Works Department
SIGNATURE:	

RECOMMENDATION

- (a) That the City of Hamilton proceed with the implementation of the Energy Efficiency projects outlined in this report, at a capital cost of \$3.14 million;
- (b) That project costs be secured using \$1.751 million from the Energy Reserve (112272), expected incentives of \$889,000 also be secured from the Energy Reserve (112272) and \$500,000 from Facilities Macassa Lodge Replacements and Refurbishing (project ID 6301341301);
- (c) That staff be directed to execute the appropriate agreements to participate in the Ontario Power Authority's Demand Response program as per the Corporate Energy Policy (PW14050), subject to the satisfaction of the General Manager, Public Works (or designate) and the City Solicitor;
- (d) That the energy savings and incentives from these projects, as supported by the Corporate Energy Policy, be used to repay the funds borrowed, plus applicable interest, from the Energy Reserve (112272) and once those funds are paid back, direct future savings to the Energy Reserve as per Appendix A, B, C and D to Report PW14097.

EXECUTIVE SUMMARY

The purpose of this report is to request Council's approval to implement energy efficiency improvements in a variety of City owned facilities. These retrofits will reduce energy consumption and energy costs in these buildings as identified through life cycle cost analysis. The total project costs are estimated at \$3.14 million. Funds borrowed from the Energy Reserve (112272) will be repaid through the resulting incentives and energy savings. The simple payback of the funds borrowed for these projects is 2.5 years (including incentives). The calculation of payback does not include the benefits

**SUBJECT: Funding Request for Energy Efficiency Projects
(PW14097) - (City Wide) - Page 2 of 7**

derived from reduced maintenance costs (especially LED lighting), which would further improve payback.

Life cycle analysis identifies these options as having low operating costs and best return for the City. These projects are presently eligible for incentive funding through the Ontario Power Authority - Save on Energy programs, in the order of \$889,000. It is possible that funding levels for this program could be reduced or possibly eliminated in the future which is another reason to move ahead with these projects in a timely manner. Specific project details are outlined in Table 1 below and further detail is provided in Appendix A, B, C and D:

Table 1 - Project Costs, Incentives and Savings

Project Name	Technology	Capital Cost	Other Financing	Incentives One Time	Financing Request	Annual Energy Savings	Payback Years
		a	b	c	d=a-b-c	e	d/e
Macassa Lodge	Combined Heat & Power	\$1,525,000	\$500,000	\$580,000	\$445,000	\$139,000	3.2*
Parking Garages	LED Lighting	\$500,000		\$50,000	\$450,000	\$125,000	3.6
Aquatic Centres	EE Lighting	\$300,000		\$20,000	\$280,000	\$50,000	5.6
Ice Arenas	Head Pressure Control	\$450,000		\$150,000	\$300,000	\$250,000	1.2
Ice Arenas	Low Emissivity Ceiling	\$75,000		\$45,000	\$30,000	\$55,000	0.5
Transit Centre	EE Lighting	\$290,000		\$44,000	\$246,000	\$88,000	2.8
Total		\$3,140,000	\$500,000	\$889,000	\$1,751,000	\$707,000	2.5*

Macassa Lodge - Combined Heat and Power

The facility is currently being modified to accommodate a larger more functional commercial kitchen space. Part of the scope of that project includes a new natural gas fueled 350 kW backup generator which is 40% of the total electrical load for the entire facility. There is a desire to have 100% capacity back up for life safety systems of this retirement facility, as requested by the client.

This project proposes a Combined Heat and Power (CHP) cogeneration system that will use natural gas as the primary fuel source to produce 600 kW of electricity and utilize the waste heat for laundry operations and an absorption chiller for space conditioning.

This system will result in a net operating benefit of \$139,000 annually that is comprised of \$122,000 in energy savings and revenue of approximately \$17,000 collected through the Ontario Power Authority's - Demand Response Program (DR). The DR program

**SUBJECT: Funding Request for Energy Efficiency Projects
(PW14097) - (City Wide) - Page 3 of 7**

pays for electrical loads to be available to reduce their electrical demand when there are periods of high demand on the provincial grid.

A portion of the capital required for the CHP project will be offset through the previously approved project funding (Macassa Lodge Replacements and Refurbishing [Project ID 6301341301]).

Parking Garage LED Lighting

City parking garages at York Street, Hamilton Convention Centre and Summers Lane are illuminated on a 24 hour continuous basis to ensure user safety and user protection.

The current lamp sources used are High Pressure Sodium and Metal Halide which at one time was the most efficient light source available. Now, LED lamp technology has progressed significantly over the last few years and is now the standard for Hamilton street lighting because of the energy savings it provides, excellent lighting quality produced and reduced maintenance.

This project will reduce lighting electricity consumption by 60 to 70%, provide a net benefit of \$125,000 annually to the City and improve the quality of lighting for these facilities. Summers Lane also will have its emergency electrical wiring brought to code.

Aquatic Centres - Energy Efficient Lighting

Within the twelve community centres that offer aquatic amenities there is a good case for upgrading the lighting to more energy efficient systems that will yield a net benefit to the City of \$50,000 annually, improve lighting conditions and reduce lamp maintenance costs. To maximize energy savings, LED lighting systems will be employed where appropriate. The specific requirements for pool lighting, may dictate other lamp sources be employed however, each design will be based on a site specific basis to ensure compliance with code requirements. A list of facilities being considered for this project is found in Appendix B.

Ice Arenas - Refrigeration Controls and Low Emissivity Ceilings

Refrigeration Controls - This project will reduce energy consumed by the refrigeration system in eighteen ice arenas. The technology utilizes controls and variable frequency drives to optimize the efficiency of the refrigeration process by modulating the operating parameters (i.e. the system head pressure). The list of arenas being considered for this project is found in Appendix C.

Low Emissivity Ceilings - To reduce the cooling load in three high use arenas, this project proposes to install a low emissivity ceiling over one ice surface at Morgan Firestone arena and over the two ice surfaces at North Wentworth arena. This proven technology yields very good energy savings and is indicated in Appendix C for each site.

The annual aggregate savings for the Refrigeration Controls and Low Emissivity Ceilings is \$305,000.

**SUBJECT: Funding Request for Energy Efficiency Projects
(PW14097) - (City Wide) - Page 4 of 7**

Mountain Transit Centre - Energy Efficient Lighting

Advances in lighting technology systems and controls are such that the Mountain Transit Centre is a prime candidate for a retrofit with energy efficient lighting. This project will see upgrades to the lighting in Buildings A and B and improve the general lighting quality in many areas.

The annual savings for this project is \$88,000.

Alternatives for Consideration - See Page 7

FINANCIAL - STAFFING - LEGAL IMPLICATIONS

Financial:

This project bundle offers a significant return to the City as the associated work can be completed within a 1.5 year time frame and the costs are to be recovered in 2.5 years, including incentives. Incentives and annual energy savings will repay Reserves in an accelerated manner.

Funds used to pay for these projects will come from different sources. The project costs of \$1,751,000 will be paid from the Energy Reserve. The Energy Reserve will also fund what is expected to come in the form of incentives, in the amount of \$889,000. These funds will be repaid to the Energy Reserve when projects are completed. The project Facilities Macassa Lodge Replacements and Refurbishing (project ID 6301341301) has \$500,000 of funding approved already. The \$500,000 will not be paid back through savings.

Directing funds from annual energy savings to the Energy Reserve is identified and approved under the Corporate Energy Policy. This allows Council and Senior Management the opportunity to direct funds in the Energy Reserve to other activities such as more energy efficiency projects, new technology analysis, avoid unexpected utility price increases or reduce capital required for projects. Ultimately the funds from the Energy Reserve could also be used to reduce the Levy.

In summary, the total annual savings of \$707,000 will be directed to the Energy Reserve. Once the capital has been paid, the annual energy savings will also be directed to the Energy Reserve as per Appendix A, B, C and D.

Staffing:

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

Legal:

The Demand Response (DR) program is offered by the Ontario Power Authority which requires entering into an agreement. The DR agreement is captured in the Corporate Energy Policy, similar to other supply agreements managed by the Office of Energy Initiatives. Legal will be consulted as part of the DR agreement review.

HISTORICAL BACKGROUND

The City of Hamilton's (City) first Corporate Energy Policy (PW07127) was created and adopted by Council in 2007 and was revised in May of 2014. The new Policy calls for a new corporate energy intensity reduction targets of 45% in 2030 and 60% in 2050. Achieving the proposed 2030 targets alone is anticipated to deliver an additional \$50 million in revenue, direct energy savings and avoided costs.

Beginning in 2007 the City of Hamilton has demonstrated its commitment to managing energy use and cost as evidence by \$32 million of energy saving and cost avoidance presented to Council in the 2013 Annual Energy Report (Report PW14049). These projects, once implemented will also contribute to the success of the energy program that will see lower energy intensity and resulting lower GHG Emissions.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

In May of 2014 Council approved the revised Corporate Energy Policy which updated the original policy approved in Report PW08144/FCS08114. The Policy committed the City to reduce energy use by 1.5% per year and 60% by 2050 with an interim target of 45% by 2030. The original target of 20% by 2020 set out in the first issue of the Corporate Energy Policy has been achieved and the measures set out in this project will move the City towards meeting its targets for 2030 and 2050.

Meeting these targets along with the previously approved Board of Health (BOH) Climate Change Actions 2012 Report (BOH13024) target of 80% Greenhouse Gas emission reduction, will put Hamilton on track to becoming a net zero carbon municipality.

Directing funds to the Energy reserve is identified and approved under Report PW14050 - Corporate Energy Policy, Section 8.1. This allows Council and Senior Management the opportunity to direct funds in the Energy Reserve to other activities such as more energy efficiency projects, new technology analysis, avoid unexpected utility price increases or reduce capital required for projects. Ultimately the funds from the Energy Reserve could also be used to reduce the Levy if that option is elected in the future. Staff recommend that subsequent to pay back of the capital costs borrowed for these projects that identified savings be transferred to the Energy Reserve (112272) as indicated in Appendix A, B, C and D.

RELEVANT CONSULTATION

Divisions with facilities that will be impacted by these measures have been consulted via management and front line staff where appropriate. This includes:

- Financial Planning and Policy, Corporate Services;
- District Recreation Operations, Community and Emergency Services;
- Macassa Lodge, Community and Emergency Services;
- Facility Management and Capital Programs, Corporate Assets and Strategic Planning, Public Works;

- Parking Operations and Maintenance, Planning and Economic Development.

To assess the technologies, installation options and costs, proposals have been created to accurately present these findings. To assist with the determination of the incentives all projects have been reviewed and assessed by the appropriate personnel at Horizon Utilities who are responsible for administering the Ontario Power Authority incentive programs.

ANALYSIS AND RATIONALE FOR RECOMMENDATION

The funding requested in this report is required to supply and install systems which will reduce operating costs, assist with GHG emission reductions and in many instances improve the facility environment. The Energy Reserve (112272) will be used to fund project costs in the amount of \$1,751,000. These funds will be repaid through energy savings. The Energy Reserve will also be used to fund \$889,000, which is identified to come from the incentive portion of the projects. Again, to keep the Energy Reserve whole, the targeted project costs and incentives will be paid back directly to the Energy Reserve. After capital has been repaid the savings will continue to be directed to the Energy Reserve. The facilities section has current funding available to contribute to the Macassa Lodge project of \$500,000 via capital account # 6301341301 and will not be paid back through savings.

Financial Considerations:

Energy Reserve Project Costs	\$1,751,000
Energy Reserve Incentive Funding	\$889,000
Contribution from Stakeholder	\$500,000
Total Project Costs	\$3,140,000
Energy Savings (annual)	\$707,000
Incentives (one time)	\$889,000
Simple payback (with incentives)	2.5 years
Simple payback (without incentives)	3.7 years

A ten year accumulated straight line savings of \$7,070,000 would be realized from these projects including incentives. Note that accumulated energy savings are expected to be even higher due to energy (electricity mainly) costs that are expected to rise by over 40% in the next four years.

ALTERNATIVES FOR CONSIDERATION

Achieving energy savings requires investment in new more efficient technology. These proposed projects are recommended based on a combination of proven technology and advanced technologies designed to repay the reserve with realistic, achievable savings.

The combined heat and power project at Macassa Lodge has had life cycle analysis performed and this system matches energy loads within the facility to the size of the system being proposed. Other options such as diesel generators were contemplated, but presented poor environmental performance and no cooling options that the recommended absorption system can deliver.

**SUBJECT: Funding Request for Energy Efficiency Projects
(PW14097) - (City Wide) - Page 7 of 7**

The lighting projects that contemplate LED systems offer the lowest operating costs, superior (lower) maintenance costs and quality lighting levels and colour rendition characteristics.

The arena ice plants each represent large energy consuming equipment. Optimizing the head pressure with controls has been piloted at two locations with favourable results. As each arena, ice plant and ice surface is unique, varying control schemes at each facility will identify ongoing savings opportunities plus aid in identifying failing equipment in advance of catastrophic failure when systems are under high use periods.

Low emissivity ceilings are a proven technology installed at most arena facilities. There is a proven track record as to the effectiveness and function of this simple measure to lower operating costs. Not having such a system installed results in higher operating costs.

ALIGNMENT TO THE 2012 - 2015 STRATEGIC PLAN

Strategic Priority #1

A Prosperous & Healthy Community

WE enhance our image, economy and well-being by demonstrating that Hamilton is a great place to live, work, play and learn.

Strategic Objective

1.6 Enhance Overall Sustainability (financial, economic, social and environmental)

Strategic Priority #2

Valued & Sustainable Services

WE deliver high quality services that meet citizen needs and expectations, in a cost effective and responsible manner.

Strategic Objective

2.1 Implement processes to improve services, leverage technology and validate cost effectiveness and efficiencies across the Corporation.

APPENDICES AND SCHEDULES ATTACHED

Appendix A Capital and Energy Reserve Refund Schedule

Appendix B Aquatic Centre Lighting Projects

Appendix C Ice Arenas Refrigeration Controls and Low Emissivity Ceilings

Appendix D Energy Savings Ten (10) Year Summary