Request for Decision

Energy Projects and Green House Gas Emissions

Presented To:	City Council
Presented:	Tuesday, Mar 31, 2015
Report Date	Wednesday, Mar 25, 2015
Type:	Managers' Reports

Recommendation

THAT City of Greater Sudbury accept the report from the Acting General Manager of Growth & Development dated March 25, 2015 on energy projects and greenhouse gas emissions, AND THAT City of Greater Sudbury proceed with the installation of rooftop solar panel projects at Pioneer Manor, Gerry McCroy Countryside Sports Complex and at Tom Davies Square Complex funded as identified in the 2015 Capital Budget.

Finance Implications

If approved, the rooftop solar panel projects of $2 million will be funded as outlined in the 2015 Capital Budget.

Signed By

Report Prepared By
Sajeev Shivshankaran
Manager of Energy Initiatives
Digitally Signed Mar 25, 15

Division Review
Danielle Braney
Director of Asset Services
Digitally Signed Mar 25, 15

Recommended by the Department
Paul Baskcomb
Acting General Manager of Growth & Development
Digitally Signed Mar 25, 15

Recommended by the C.A.O.
Doug Nadorozny
Chief Administrative Officer
Digitally Signed Mar 25, 15

Background

This report is in response to a motion (CC2015-65) brought forward by the Council at the February 24, 2015, meeting of the Council of the City of Greater Sudbury. The motion reads as follows:

> *THAT the City of Greater Sudbury direct staff to weigh all our project options to identify the best use of our Green House Gas Emissions (GHG) emission reduction dollars and return to Council with a business case analysis of those projects which will provide the biggest Green House Gas Emissions return on investment before any project is approved or implemented;*
>
> *AND THAT the projects originally approved in Motion CC2015-26 not proceed at this*

time and a report be prepared for March 10.

Greenhouse Gases

By creating Earth's 'greenhouse effect', greenhouse gases (GHG) make this planet suitable for life as we know it. Without this effect, Earth would be in a constant deep freeze. Greenhouse gases act like an insulating blanket that traps sufficient solar energy to keep the global average temperature in a range that's conducive to life. GHGs include gases like water vapour, carbon dioxide, methane, ozone and nitrous oxide.

Although the 'greenhouse effect' has been established by natural processes spanning millions of years, recent industrialization and urbanization has been and is continuing to create increases in GHGs concentrations (especially carbon dioxide) in the atmosphere. Use of fossil fuels (e.g., coal and petroleum) as a primary energy source has, in particular, resulted in the release of vast quantities of GHGs. These increases are thought by most scientists to be linked to human-induced climate change (global warming) that poses important risks for human and natural systems. Controlling and managing GHG emissions in the sphere of human activities, therefore, has become an important focus for mitigating the climate change.

Current GHG landscape

Ontario does not currently have a cap-and-trade system in place aimed at greenhouse gas (GHG) reduction. In 2008, Ontario had initially joined as a member of the Western Climate Initiative (WCI) along with Arizona, California, Montana, New Mexico, Oregon, Utah, Washington, British Columbia, Manitoba and Quebec. The intent of the WCI is to develop emissions trading programs and other regional initiatives. Of the original members, only California, B.C. and Quebec remain.

In 2009, the *Environmental Protection Amendment Act (Greenhouse Emissions Trading)* amended the *Ontario Environmental Protection Act* to allow for the creation of emissions trading programs that employed "economic and finance instruments and market-based approaches". Also in 2009, Ontario Regulation 452/09 obliged certain large emitters (over 25,000 tonnes of GHG per year) to begin reporting greenhouse gas emissions to the Ministry of the Environment (now called the Ministry of the Environment and Climate Change - MOECC).

Ontario is currently consulting with Ontario residents on *Ontario's Climate Change 2015 Discussion Paper*, to assist the government on deciding on a mechanism for dealing with

GHG, such as cap-and-trade or carbon tax. A climate change strategy is expected to be released this spring.

Renewable energy contracts issued by the Ontario Power Authority (now Independent Electricity System Operator) stipulate that any carbon credits gained from renewable energy projects belong to the OPA. It is uncertain at this time whether ownership of carbon credits from renewable energy projects will be affected by upcoming provincial climate change strategy.

GHG Return on Investment

Controlling and managing GHG (in this case mainly carbon dioxide) emissions in municipal operations, like other human activities, are mostly tied to use of energy that is derived from fossil fuels. There exist many projects related to municipal operations that could result in a reduction in GHG emissions. The question posed at the February 24 th Council meeting seeks to find the return on investment in terms of GHG reductions for two specific projects previously reported to Council and appended to this report:

1. Rooftop Solar Photovoltaic installations at Pioneer Manor, Gerry McCrory Countryside Arena, and Tom Davies Square;
2. LED streetlight conversion.

Rooftop Solar Projects

On Sept 3rd 2014, the City was awarded three FIT-V-3.0 contracts with a 20-year term to install and supply electricity to the grid from rooftop solar photovoltaic projects on the following City buildings (respective electricity generation capacities listed):

a. Tom Davies Square Complex - 75 kW
b. Gerry McCrory Countryside Sports Complex - 245 kW
c. Pioneer Manor - 245 kW

The 20-year contracts guarantee a price of 32.9 cents/kWh for generations above 100 kW and 34.5 cents/kWh for generations between 10 kW and 100 kW. This corresponds to estimated net revenue of $231,000 per year for 20 years.

The three rooftop solar PV projects would be generating a demand load of 806,000 kWh

annually. This corresponds to an annual reduction of 77.38 Metric Tons of Carbon Dioxide. The analysis in Appendix –A (MACC) reveals that this project produces an abatement cost of -$796.84 per ton of CO_2e.

LED Streetlight Conversion

Infrastructure Services presented reports on LED Streetlight Conversions at the Operations Committee of February 3, 2015 with an update at the Finance and Administration Committee of February 11, 2015. The information provided in these reports has formed the basis for the calculation of the reduction in GHG emissions and its cost.

The first report recommends the conversion of existing High Pressure Sodium (HPS) and Low Pressure Sodium streetlight fixtures to LED to take advantage of a pre-approved incentive of $1.85 million to partially fund the replacement of 11,288 fixtures. The saveONenergy Retrofit Program Ontario offered by the Ontario Power Authority is a per fixture rebate based on wattage. The rebate will apply only for fixture replaced before the end of 2015. The report states that it is unlikely that all remaining 11,288 fixtures will be replaced by the end of 2015. Depending on the scope of the project, the anticipated rebate could range between $0.5 M and $1M.

In terms of reduction in GHG emissions based on a total project cost of $8M, the project would produce savings of 4,439,938 kWh annually. This corresponds to an annual reduction of 426.23 Metric Tons of Carbon Dioxide and abatement cost of -$1341.45 per ton of CO_2e.

It should be noted that the above calculations are based on the assumption of project completion in this year; however the LED Street lights Report suggests a three year conversion program with preliminary estimates in the amounts of $4 million in 2015, $2 million in 2016 and $2 million in 2017.

Other GHG reduction projects

The City was successful in receiving total incentives of $130,539 for the retrofit of 112 small projects under the Save On Energy Small business lighting Blitz program. With a contribution of $72,326 and a simple payback of 1.14 years, energy savings were estimated at 504,820 kW annually or $63,680 in cost avoidance perpetually.

Forty-seven various lighting energy retrofit projects saved 1,943,018 kW or $177,253 annually in cost avoidance. Incentives of $516,241 were leveraged with an investment of $1,577,812. Some of the bigger projects are arena lighting upgrades at the T. M. Davies Community Centre / Arena, Toe Blake Memorial Arena, Dr. Edgar Leclair Community Centre / Arena and the Sudbury Arena.

Other types of retrofit projects such as a heating upgrade to Infrared technology at the Raymond Plourde Arena, replacing the laundry system ozone laundry at Pioneer Manor, chiller and boiler replacement at 199 Larch, heat recovery ventilators at the transit garage and Pioneer Manor; various pumps at TDS and dehumidifier equipment, gas heater retrofit at the Capreol Arena and Jacob Street lift station resulted in cost avoidance of $219,263 annually and energy savings of 3,824,672 kWh. These projects yielded incentives worth $476,942.

Energy Audits conducted at various City facilities along with Water and Waste Water Plants yielded incentives worth $81,463 with a capital investment of $57,683.

In addition to these, other initiatives of the City including road improvements which reduce congestion and fleet upgrades to include more energy efficient vehicles also have the effect of reducing Green House Gas emissions.

Conclusion

This report's focus is to compare GHG emission benefits between the proposed LED Streetlights project and the proposed Solar PV project. It is intended to serve as additional background information as Council deliberates on these two projects. The attached three reports previously seen by Council contain the financial business case information for the projects. Both projects would result in significant reductions in GHG emissions.

This report contains a recommendation to proceed with the Solar panel projects as the previous decision of Council to proceed (Jan 27th, 2015) was reconsidered on Feb 24th, 2015 with a direction to prepare this report. The LED streetlight conversion report is brought forward as a deferred item on the Mar 31st, 2015 Council Agenda and contains a recommendation to proceed with the project.

Sudbury

Presented To:	City Council
Presented:	Tuesday, Jan 27, 2015
Report Date	Thursday, Jan 22, 2015
Type:	Managers' Reports

Request for Decision

Solar Roof Top Projects Financial Plan

Recommendation

THAT the City of Greater Sudbury proceed with

1. The installation of the roof-top solar panels at Pioneer Manor, Gerry McCrory Countryside Arena and at Tom Davies Square;

2. AND THAT staff be directed to identify funding sources to pay for the estimated project costs and to include this project in the 2015 Capital Budget.

Finance Implications

The City does not have any dedicated funds for this initiative. The uncommitted balance in the Capital Financing Reserve Fund - General is approx $2.2M. If approved, staff will review the City's Reserve and Reserve Funds in an attempt to identify an appropriate source of funding in the 2015 Capital Budget.

Signed By

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Recommended by the C.A.O.
Doug Nadorozny
Chief Administrative Officer
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Purpose

To request direction from Council on whether to install rooftop solar panels at up to three City buildings. The rooftop solar panels would be in accordance with FIT –V-3.0 contracts which consists of a 20-year term of guaranteed revenue rates per power generated. A previous report to Council in September 2014 is attached as Appendix A.

Background

History of FIT Program

In 2009, the Ontario government enacted the Green Energy and Green Economy Act, 2009 (Green Energy

Act) with the objective of sponsoring the development of renewable energy generating capacity within the province. Under the GreenEnergy Act, the Feed-in Tariff (FIT) Program was introduced.

The FIT Program was originally launched in September 2009, and the Ontario Power Authority (OPA) started accepting applications on October 1, 2009. As part of the initial FIT Program, attractive pricing was given for solar (rooftop, ground mount, commercial scale and residential scale), wind, hydro and bio-energy projects. With stable power purchase contract terms of 20 to 40 years, and favourable terms to encourage participation, Ontario's FIT Program attracted substantial interest and participation from investors around the world.

As part of the scheduled 2-year review of the initial FIT Program in 2011, the FIT price of renewable energy in Ontario was adjusted and the rules governing the program were also revised to include greater community and Aboriginal participation through a new priority point system, which will also prioritize projects with municipal support. On July 11, 2012 Ontario's Minister of Energy issued a directive to the Ontario Power Authority (OPA) clarifying certain policies and slightly adjusting the Feed-in Tariff (FIT) Program rules and contract. The directive was issued following the Ontario government's review of feedback regarding the draft rules, contract forms and definitions for the revised FIT (Version 2.0) Program issued in April of 2013.

Following the FIT (Version 2.0) Program had closed and a third review of the FIT program has been underway to again consider modifying the program based on the experience gained from the previous iterations. As a result of this review, the Ontario Power Authority (now known as IESO) has now made available the final FIT (Version 3.0) Program documents, including the program rules, contract, standard definitions, rate schedules and application forms. The window for the submission of applications under the FIT (Version 3.0) Program opened on November 4, 2013 and closed on December 16, 2013. The City received confirmation that its application was accepted on September 3 rd, 2014.

City of Sudbury's FIT application status update

The Solar projects were initiated in line with the City's long term Green Energy Initiatives and Plan (Appendix B) by the City's Energy Office. Pursuant to this, a Council decision CC2013-313 for support of Solar Rooftop installation was approved and By- law 2014-217 enacted on September 9th, 2014 authorized the Chief Administrative Officer to execute Feed-in-Tariff documents. The City had applied for five sites out of which only three were found viable for the Program. The following milestones have been achieved so far:

1. The City of Greater Sudbury was successful in applying and securing three FIT-V-3.0 contracts for Solar Roof top installations on the following sites:
    a. Pioneer Manor
    b. Tom Davies Square Complex
    c. Gerry McCrory Countryside Sports Complex

2. As a requirement for the application, the City completed a preliminary design/study and a preliminary structural analysis for the above-noted sites.

3. The City obtained an Initial Feasibility Analysis (IFA) from OPA confirming that there is enough capacity to accept the generators on the utility system Grid.

The following milestones are pending:

1. Council approval of funding for the project
2. Issuance and award of a Request For Proposal for a design-build project
3. Complete Connection Impact Assessments for each site through Greater Sudbury Utilities (GSU), based on the final design and specifications
4. Application for the "Notice to proceed" before the deadline of Dec 3rd, 2015
5. Submit a Metering Plan to GSU and OPA
6. Meet the deadline of commission and commercial operation by March 3rd, 2016

Project Expenses to date:

The project expenses incurred to date are approximately:

- Initial application fee $2,000
- Completion and performance security of $ 2,825
- Initial feasibility study $20,861
- Contract's legal review $ 763

General Comments:

- Warranty on the all the components have been calculated for the 20-year life of the project has been factored for the installation.
- A provision for the insurance of the project addition to the building has been included.
- Further the maintenance and monitoring cost has also been calculated to reflect the operating expenses.
- The snow loading and effects on production in winter has been factored in the generation calculations of Consultant.
- After the 20-year contract, unless a new contract can be negotiated with the IESO, the project can be repurposed or upgraded for a closed-loop operation as most of the components will be just out of warranty but the panels still will be under warranty for a further 5 years.
- The design and installation will be in accordance with the City's Purchasing By-Law to ensure a competitive purchasing process.

Project Summary

On Sept 3rd, 2014 the City was awarded three FIT-V-3.0 Contracts with a 20-year term to install and supply electricity to the Grid from installations of Solar Photovoltaic Rooftop installations on the following City buildings with respective generation capacities:

a. Tom Davies Square Complex - 75 kW
b. Gerry McCrory Countryside Sports Complex - 245 kW
c. Pioneer Manor - 245 kW

The 20-year contracts guarantee a price of 32.9 cents/kWh for generations above 100 kW and 34.5 cents/kwh for generations between 10 kW and 100 kW. This corresponds to estimated revenue of $267K per year for 20 years.

The project analyses were performed with the data from the preliminary design and structural analysis performed by Arborus Consulting (Arborus) and Halsall & Associates. The energy produced was calculated from a modeling program which incorporated the past 30 years of Sudbury's weather data. A preliminary estimate was provided for revenue, capital and operating costs.

Environmental Implications

The creation of the Large Rooftop Solar Energy Program will create a new source of clean, renewable energy and reduce the amount of greenhouse gas emissions produced from an equivalent amount of conventional energy. It is expected that when fully implemented, the amount of solar energy produced will be enough to power more than 116 homes. Further the City's carbon footprint will be reduced by 556 Metric tons of Carbon Dioxide which is the equivalent of removing 117 passenger vehicles off the road, or the carbon sequestered by 456 acres of forests in one year.

Pros/Opportunities:

- Total capacity of 565 kW was approved based on a competitive application process
- Project creates a constant net revenue stream of $231K - $237K / year for a total of $4.6 M - 4.7 M over 20 years
- Illustrates the City's commitment to an environmental friendly project to manage resources efficiently, responsibly and effectively and is in line with the Vision, Mission and Values of the City as

it relates to encouraging innovation and accepting risks. It portrays the City as an excellent environmental steward.
- Value of electricity produced provides a reasonable return to the City

Cons/Risks:

- Payback ranges less than 7 years to over 13 years based on sensitivity analysis per site location
- Roof top panels will cause costs for future roof replacements/repairs on these buildings to increase based on temporary removal of panels
- Loss of revenue generation during future roof replacements/repairs if they occur during next 20 years
- New fire code compliance may require additional equipment for disconnect at the pole
- Risk of equipment failures not covered by warranty
- Risk of snow load on solar panels in excess of estimates by consultants

Experience by Others:

Research was completed by City staff with other Municipalities and Organizations. In 2010, the City of Markham began developing a project to install a 250 kW AC grid-tied solar photovoltaic (PV) system to the rooftop of a warehouse. The system array was a ballast system on a flat roof top that had a total cost of $1,670,000. At the FIT rate of $0.713/kWh, it was expected to generate on average $180,000 in revenue and a simple payback under 10 years. The quantum of electricity produced was as per the design estimates.

Financial Analysis:

The estimated costs and estimated revenue information was extracted from the report titled "Greater Sudbury: Solar Feasibility Study Technical Report" prepared in 2013 by Arborus Consulting (Arborus). The capital costs prepared by Arborus include engineering, equipment, installation and were revised for the following items:

- Estimated inflation of 2% per year for 2014 and 2015 as cost estimates were prepared in 2013.
- Condition Impact Assessments per site
- Extended inverter warranty (20 years)
- Non-refundable portion of HST

The operating costs were based on rates per watt from discussion with industry peers based on their experience to include maintenance and monitoring, as well as an estimate for additional insurance premiums.

A sensitivity analysis was completed to include 20% contingency on the capital and operating costs as they are considered "preliminary" by Arborus. In addition, a sensitivity analysis was completed on the estimated revenues of +/- 15% to review impact on revenues and payback if actual solar revenue generation is to be different from estimates prepared by Arborus.

Appendix C provides estimated financial information and sensitivity analysis for all three solar rooftop project sites. The following is a summary of the estimated number years required to payback the capital investments, by each project site.

No Contingency	Tom Davies Square	Gerry McCrory Countryside Arena	Pioneer Manor	Total
Pessismistic (15% Decrease to Expected Revenues)	11.1	9.5	9.2	9.6
Expected	9.2	7.9	7.6	8.0
Optimistic (15% Increase to Expected Revenues	7.9	6.8	6.5	6.8

With 20% Contingency	Tom Davies Square	Gerry McCrory Countryside Arena	Pioneer Manor	Total
Pessismistic (15% Decrease to Expected Revenues)	13.7	11.8	11.3	11.9
Expected	11.3	9.8	9.4	9.8
Optimistic (15% Increase to Expected Revenues	9.7	8.3	8.0	8.4

Based on the "expected" analysis, the following information is based on including/excluding 20% contingency on costs:

Total estimated capital costs	$1.9 M to $2.3 M
Total estimated annual revenue from energy produced	$266,900
Total estimated annual operating costs	$29,700 to $35,700
Net estimated annual revenue	$237,100 to $231,200
Payback in years	8 to 10 years

If Council approves to proceed with any or up to three solar rooftop project sites, the staff will include this project in the 2015 Capital Budget and develop a funding strategy, most likely from the City's reserve funds.

If the Capital Funding is drawn from a Reserve Fund, it is recommended that the annual net revenues (after operating costs and any future related costs) generated for the next 20 years be allocated as follows:

- Repayment of borrowing from reserve funds
- Once reserve fund is repaid in full, then net revenues will be included in the Operating Budget to reduce the tax levy.

Lost Interest Revenue:

Debt financing costs for this project have not been incorporated in this project. If the project is approved by Council, the funding source will likely come from reserve funds and therefore, these funds would no longer be available to earn interest until repaid from future revenues generated. Therefore, there will be lost interest revenue on the reserve fund of approximately $195K - $282K based on the capital cost estimate of $1.9M - $2.3M.

Recommendation

It is recommended that the City of Greater Sudbury proceed with the installation of the roof-top solar panels at Pioneer Manor, Gerry McCrory Countryside Arena and at Tom Davies Square.

APPENDIX "A"

Request for Recommendation

City Council

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Type of Decision								
Meeting Date	September 9, 2014			Report Date	September 8, 2014			
Decision Requested		Yes	No	Priority		High		Low
	Direction Only			Type of Meeting		Open		Closed

Report Title

Feed-in-Tariff Contract for 3 Rooftop Solar Projects

Budget Impact/Policy Implication

This report has been reviewed by the Finance Division and the funding source has been identified.

Background Attached

Recommendation

For information

Recommendation Continued

Recommended by the Department

Paul Baskcomb
Acting General Manager of Growth & Development

Recommended by the C.A.O.

Doug Nadorozny
Chief Administrative Officer

Report Prepared By	Division Review
Danielle Braney for Sajeev Shivshankaran Manager of Energy Initiatives	Danielle Braney. Danielle Braney Director of Asset Services

Subsequent to the City of Greater Sudbury's application to the Ontario Power Authority for rooftop solar projects in 2013, the City has just received an Offer of a Feed-in-Tariff contract for 3 sites. This is an opportunity for the City to participate in renewable energy initiatives, generate additional revenues and bring clean sources of energy into the supply mix. The report is before you as the response to the Offers is time sensitive.

On October 8, 2013 Council passed a blanket support resolution for rooftop solar installations anywhere in the City of Greater Sudbury. This resolution allowed the City to make application to the Ontario Power Authority (OPA) for the feasibility of installing solar panels at the following locations:

1. Pioneer Manor Long Term Care Facility;
2. Gerry McCrory Countryside Sports Complex;
3. Transit/Fleet Garage; and
4. Sudbury Wastewater Treatment Plant.

An initial review by the OPA determined that the Transit/Garage would not be eligible for a grid connection. The City did not pursue the application for an installation at the Sudbury Wastewater Treatment Plant as structural analysis of the roof could not be confirmed without costly testing. An application for Tom Davies Square was submitted as a substitute and was found to be eligible.

On September 3, 2014, the City received from the OPA an offer of a FIT Contract for the following 3 projects:

1. Pioneer Manor Long Term Care Facility;
2. Gerry McCrory Countryside Sports Complex; and
3. Tom Davies Square.

The Offers must be signed and returned to the OPA within 20 Business Days of the date of the letter. If the City fails to comply, the offer will be revoked and the application will be deemed to be withdrawn. The executed offer must be accompanied by a Compliance and Performance Security of $2,825.00.

There are still a few steps to the process before the projects can go ahead. The OPA will issue a Notice to Proceed once the City provides a Connection Impact Assessment (approximate cost $6,000 per site), a Metering Plan, the Renewable Energy Approval and registration with the MOE, a Financing Plan in a Prescribed Form and additional Completion and Performance Security of $2,825.00.

The following provides financial information for all three solar rooftop project sites. The cost and revenue information was extracted from the report titled "Greater Sudbury: Solar Feasibility Study Technical Report" prepared by Arborus Consulting. The capital and operating costs were prepared in 2013 dollars and have been inflated by 2% to estimate in 2014 dollars. In addition, an additional 20% for budgeting purposes as the estimates are considered preliminary.

Total estimated capital costs	$2.2 million
Total estimated annual revenue from energy produced	$266,900
Total estimated annual operating costs	$16,700
Net estimated annual revenue	$250,200
Payback in years	8.8 years

Staff will complete additional financial analysis for these three sites along with funding sources (ie. incorporate within capital budget, internal financing with debt repayments to be offset by the annual net revenue, etc) to be presented to Council at a future date.

If internal financing is used to fund the capital costs, then the estimated annual debt repayments is shown below that will reduce the net contribution to the operating budget:

Annual debt repayments (based on 3.7% interest rate over 20 years)	$157,800
Net Annual Contribution to Operating Budget after debt repayments	$92,400
Total Profit over 20 years (term of revenue contract)	$1.8 million
Payback in years	12.6 years

The payback in years for the Countryside Arena and Pioneer Manor projects are respectively estimated at 12.58 and 12.04 both with a contract capacity of 245 kW, whereas the payback period for the TDS will be 14.5 years due to its lower generation capacity of 75 kW.

If revenues are 15% higher than estimated, the projects will generate approximately $2.6M over 20 years with a payback of 10.9 years. If revenues are 15% lower than estimated, the projects will generate approximately $1.04M over 20 years with a payback of 15 years. These amounts are based on internal debt financing for all 3 sites.

The funding for the security deposits will be through the energy conservation account from the 2014 Capital Budget in Assets section and/or to be funded by the operating department.

Risk factors associated with the projects include: revenue can be lower than estimated by the consultants' report, equipment can fail before the end of the revenue contract term or have higher repairs/maintenance costs than estimated.

A Bylaw also appears on the addendum to authorize the CAO to enter into the Feed-in Tariff Contracts.

Request for Decision

Rooftop Solar Projects

Presented To:	City Council
Presented:	Tuesday, Oct 08, 2013
Report Date	Wednesday, Oct 02, 2013
Type:	Managers' Reports

Recommendation

WHEREAS the City of Greater Sudbury proposes to construct and operate Rooftop Solar Photovoltaic Projects (the "Projects") in the City of Greater Sudbury as an Applicant under the Province's FIT Program on Lands described as follows:

1. Pioneer Manor Long Term Care Facility; 2. Gerry McCrory Countryside Sports Complex; 3. Transit/Fleet Garage; 4. Sudbury Wastewater Treatment Plant.

AND WHEREAS other Applicants have been and will continue to propose to construct and operate Rooftop Photovoltaic Projects (the "Projects") in the City of Greater Sudbury under the Province's FIT Program;

AND WHEREAS Applicants have requested that Council of the City of Greater Sudbury indicate by resolution Council's support for the construction and operation of the Projects in the City of Greater Sudbury;

AND WHEREAS, pursuant to the rules governing the FIT Program (the "FIT Rules"), Applications whose Projects receive the formal support of Local Municipalities will be awarded Priority Points, which may result in the Applicant being offered a FIT Contract prior to other persons applying for FIT Contracts;

NOW THEREFORE BE IT RESOLVED THAT: Council of the City of Greater Sudbury supports the construction and operation of the Projects anywhere in the City of Greater Sudbury.

This resolution's sole purpose is to enable the Applicant to receive Priority Points under the FIT Program and may not be used for the purpose of any other form of municipal approval in relation to the Application or Project or any other purpose.

Signed By

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Digitally Signed Oct 2, 13

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Recommended by the Department
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Recommended by the C.A.O.
Doug Nadorozny
Chief Administrative Officer
Digitally Signed Oct 2, 13

Finance Implications

No capital funding has been identified and business cases will be undertaken and brought back to Council for consideration and approval prior to proceding with any project.

Background

Ontario Power Authority's FIT (Feed-in-Tariff) Program encourages the construction and operation of rooftop solar, ground mount solar, bio-energy and on-shore wind generation projects. The new version of FIT is favourable towards Municipalities and Public sector organizations by awarding priority points; City Council resolution for the particular project enables to secure the Priority points. This increases the chances of securing a FIT contract for the Sudbury-area Applicants with OPA for 20 years at a pre-determined rate. The FIT-3 application window is expected to open in October 2013 for a period of 30 days only.

Business cases for the projects will be undertaken and brought back to Council for consideration and approval prior to proceeding with any municipal project initiated by the City of Greater Sudbury.

As a point of information, staff had considered solar projects on some of the facilities in the south end of the City in previous years, however, a connection to the grid was not possible. Since then, necessary upgrades were effected to the Martindale Substation to accept additional connections.

DETAILS:

The Ontario Power Authority (OPA) is a not-for-profit corporation with a mandate from the Ontario government to ensure a reliable, sustainable supply of electricity for the province.

It has three key areas of focus:

- leading and coordinating conservation efforts across the province
- planning the power system for the long term
- ensuring development of needed generation resources

The Ontario Power Authority (OPA) is responsible for designing and implementing the FIT (Feed- in-Tariff) Program, which include the program rules, price schedule, contracts, registration, application and contracting processes as well as ongoing contract management activities.

SMALL FIT CONTRACTS OFFERED

Ontario's clean energy economy continues to grow as the Ontario Power Authority (OPA) offers 951 new Small Feed-in Tariff (FIT) renewable energy contracts. These contracts represent 146.5 megawatts (MW) of power, enough to power more than 21,000 homes.

Over 98 percent of the successful applications received municipal council support resolutions. Most of these contract offers are for solar photovoltaic (PV) projects, including 934 solar PV projects, 16 bioenergy projects and one waterpower project. In total, project developers are expected to invest over $750 million in the Ontario economy, and the projects are expected to result in 2,200 jobs for Ontarians.

The projects announced lately include 46 MW or 219 projects with Aboriginal participation and 27.8 MW or 136 projects with community participation.

These contracts are being offered to successful applicants who applied during the Small FIT application period from December 14, 2012, to January 18, 2013. The OPA was authorized to offer up to 200 MW of contracts to these applicants; the remaining 53.5 MW of capacity that was not contracted in this round will be added to the procurement target for this fall's Small FIT application period. Details for this next window will be posted on the FIT website when they are available. *(Source: OPA website)*

Approximately 70% of Ontario's electricity is generated by Ontario Power Generation at its hydroelectric, nuclear and fossil fuel stations. Independent power producers generate the remaining 30%. (*Source: OPA website*)

FIT (Feed in Tariff) Program :

The Ontario Power Authority (OPA) has created a program that encourages the development of renewable energy projects across Ontario. The program delivers significant benefits to project developers - including communities and Aboriginal groups - as well as equipment suppliers and installers, consumers and the overall provincial economy. The Ontario Power Authority (OPA) is now accepting Small FIT applications for renewable energy projects with a proposed capacity of more than 10 kilowatts and up to 500 kilowatts (defined in the FIT Rules as Small FIT Projects).

The prices for delivered power to the grid are designed to cover project costs and provide a reasonable rate of return on the investment over the term of the contract. The FIT Version 3.0 program from OPA is open for applicants and is applicable for construction and operation of rooftop solar, ground mount solar, bioenergy and on-shore wind generation projects, where in, OPA issues a 20 year contract with the participant for the purchase of the power at a predetermined rate.

One of the core goals of the FIT Program is to encourage the development of community-based renewable energy projects. This is done through the creation of a community contract capacity set-aside, reduced security payments, additional price incentives, the granting of priority points and opportunities for funding through the Community Energy Partnerships Program.

The application review process, all remaining eligible applications will be ranked based on the number of priority points they have received, as well as by timestamp. An application's timestamp will determine which application is screened for connection first if two or more applications have the same number of priority points. (*Source: OPA website*)

Municipal Council Support

The OPA screens the Applicants for their proposed project and its viability in order to ensure that the grid capacity for renewable energy is well spent. OPA considers various aspects such as financial capability, design thoroughness, proposed project timeline etc. on which it issues merit points.

One of the aspects that the OPA considers to award priority points is for local Municipal support for renewable energy projects. OPA favours such proponents with priority points on basis of Municipal Council support for these renewable generation projects.

If a local municipality does pass a resolution support in this effect, the resolution will only allow the applicant to obtain priority points under the FIT program. Projects that receive a contract from the OPA will still need to obtain any required approvals prior to construction (building permits, REA, etc.). The Council's support resolution for renewable projects in the City of Greater Sudbury will give the Applicants the much needed extra priority for securing the FIT (Feed-in-tariff) contract. (*Source: OPA website*)

This recommendation is for a Council blanket support resolution for rooftop solar photovoltaic anywhere in the City of Greater Sudbury. The blanket support resolution would not apply to ground-mount solar projects or any other type of renewable energy project encouraged by the Province's FIT Program.

APPENDIX "B"

Conservation and Demand Management Plan

Regulation

Ontario Regulation 397/11 was created under the Green Energy Act, 2009 and is being phased in over a number of years. The first phase required that Ontario public sector organizations complete a summary template that details the energy consumption, size, age and usage plans of each building they own. The City of Greater Sudbury submitted the first report in July 2013, as required. The report must be updated yearly thereafter.

The second phase of the regulation is as described below;

"A public agency shall prepare, publish, make available to the public and implement energy conservation and demand plans or joint plans in accordance with sections 6 and 7 of the Act and with this Regulation. An energy conservation and demand management plan is composed of two parts as follows:
A summary of the public agency's annual energy consumption and greenhouse gas emissions for its operations.
A description of previous, current and proposed measures for conserving and otherwise reducing the amount of energy consumed by the public agency's operations and for managing the public agency's demand for energy, including a forecast of the expected results of current and proposed measures."

Ontario Regulation 397/11 also requires *"confirmation that the energy conservation and demand management plan has been approved by the public agency's senior management."*

The plan provides a framework to incorporate various initiatives identified in the plan in future operating and capital budgets.

2011 Baseline

The City of Greater Sudbury owns and operates more than 600 buildings. Under the provisions of Regulation 397/11, 422 of these require energy and emission monitoring and reporting. In 2011, these facilities consumed approximately 120eGWh of total energy and produced around 17,000 tonnes of greenhouse gas emissions. The associated total energy cost was approximately $9.6million (77% for electricity and 23% for natural gas).

Energy Conservation Projects

Throughout 2012 and 2013, the City implemented various energy conservation projects that realized energy savings of approximately 4,018,842 kWh or perpetual cost avoidance of $297,386 per annum.

Opportunities for Energy Reduction

To identify other opportunities for energy reduction, the City commissioned 20 facility audits, including Pioneer Manor Long Term Care Facility, Tom Davies Square and various Fire and EMS stations. These

audits identified energy conservation measures, as well as solar and street lighting retrofit projects and improvements to waste water treatment plants.

Energy Use Patterns

Of the 600 city-owned facilities, 422 buildings require energy and emission monitoring and reporting in accordance with Ministry of Energy guidelines. These energy use patterns include utility costs, energy distribution, greenhouse gas emissions, and energy use intensities. The buildings are categorized into the following six groups:

1. Administrative Buildings
2. Emergency & Essential Services
3. Fleet Services
4. Leisure Centres
5. Public Libraries
6. Water & Wastewater Plants

Moving Forward

Buildings in the CGS' Leisure Centres category have the greatest potential for energy reductions. Together, Leisure Centres and Water & Wastewater Plants accounted for 75% of the City's total electricity consumption. Buildings in the Leisure Centres group also accounted for 59% natural gas consumption and 49% of total annual green house gas emissions.

As part of its ongoing efforts to reduce energy consumption, the City intends to commission energy audits of the facilities within the Leisure Centres category. These audits would identify energy conservation measures that could contribute to the City's energy savings.

Energy Team

The City of Greater Sudbury will establish an Energy Team to initiate discussions on how to improve energy efficiencies by identifying opportunities in the following areas:

- New building construction
- Technical standards
- Aging equipment replacement
- Operating strategies improvement
- Alternative energy technologies
- Energy awareness

The Energy Team will meet regularly with the following objectives:

- Develop strategies to reduce energy consumption

- Integrate best practices into daily operations
- Raise awareness of the consumption of energy within each department
- Track energy reduction

Monitoring and Verification

Monitoring and tracking energy data is a key element of energy management. The City uses software developed by York Region to measure energy consumption, energy costs and greenhouse gas emissions for municipal buildings and facilities. The system can also report on variances from specific targets, calculate energy use indices and relate energy consumption to building systems.

Appendix C - Solar Roof Top Financial Analysis

	TDS		Gerry McCrory Countryside Arena		Pioneer Manor		All 3 Project Sites	
Estimated Energy Produced (kW) per Consultant Report	75		245		245		565	
FIT Contract Revenue Rate (kWh)	0.345		0.329		0.329			
	No contingency	With 20% contingency	No contingency	With 20% contingency	No contingency	With 20% contingency	**No contingency**	**With 20% contingency**
Pessimistic (15% Decrease to Expected Revenues)								
Estimated Capital Costs	$299,632	$359,558	$812,288	$974,746	$776,825	$932,190	**$1,888,745**	**$2,266,494**
Estimated Annual Revenue	31,085	31,085	97,878	97,878	97,878	97,878	**$226,840**	**$226,840**
Estimated Annual Operating Costs	3,996	4,795	12,754	15,305	12,979	15,574	**$29,729**	**$35,674**
Estimated Annual Net Revenue	$ 27,088	$ 26,289	$ 85,123	$ 82,573	$ 84,899	$ 82,303	**$ 197,111**	**$ 191,165**
Payback in Years	**11.06**	**13.68**	**9.54**	**11.80**	**9.15**	**11.33**	**9.58**	**11.86**
Margin of Safety for Breakeven	45%	32%	52%	41%	54%	43%	**52%**	**41%**
Annual Return on Investment	9.0%	7.3%	10.5%	8.5%	10.9%	8.8%	**10.4%**	**8.4%**
Expected								
Estimated Capital Costs	$299,632	$359,558	$812,288	$974,746	$776,825	$932,190	**$1,888,745**	**$2,266,494**
Estimated Annual Revenue	36,570	36,570	115,150	115,150	115,150	115,150	**$266,870**	**$266,870**
Estimated Annual Operating Costs	3,996	4,795	12,754	15,305	12,979	15,574	**$29,729**	**$35,674**
Estimated Annual Net Revenue	$ 32,574	$ 31,775	$ 102,396	$ 99,845	$ 102,171	$ 99,576	**$ 237,141**	**$ 231,196**
Payback in Years	**9.20**	**11.32**	**7.93**	**9.76**	**7.60**	**9.36**	**7.96**	**9.80**
Margin of Safety for Breakeven	54%	43%	60%	51%	62%	53%	**60%**	**51%**
Annual Return on Investment	10.9%	8.8%	12.6%	10.2%	13.2%	10.7%	**12.6%**	**10.2%**
Optimistic (15% Increase to Expected Revenues)								
Estimated Capital Costs	$299,632	$359,558	$812,288	$974,746	$776,825	$932,190	**$1,888,745**	**$2,266,494**
Estimated Annual Revenue	42,056	42,056	132,423	132,423	132,423	132,423	**306,901**	**$306,901**
Estimated Annual Operating Costs	3,996	4,795	12,754	15,305	12,979	15,574	**$29,729**	**$35,674**
Estimated Annual Net Revenue	$ 38,059	$ 37,260	$ 119,668	$ 117,118	$ 119,444	$ 116,848	**$ 277,172**	**$ 271,226**
Payback in Years	**7.87**	**9.65**	**6.79**	**8.32**	**6.50**	**7.98**	**6.81**	**8.36**
Margin of Safety for Breakeven	61%	52%	66%	58%	67%	60%	**66%**	**58%**
Annual Return on Investment	12.7%	10.4%	14.7%	12.0%	15.4%	12.5%	**14.7%**	**12.0%**

All 3 Project Sites Over 20 Years	Total with no contingency at end of 20 years	Total with 20% contingency at the end of 20 years
Pessimistic		
Total Estimated Capital Costs	$1,888,745	$2,266,494
Total Estimated Revenue	$4,536,790	$4,536,790
Total Estimated Operating Costs	$594,575	$713,490
Total Estimated Net Revenue	$3,942,215	$3,823,300
Payback in Years	9.58	11.86
Expected		
Total Estimated Capital Costs	$1,888,745	$2,266,494
Total Estimated Revenue	$5,337,400	$5,337,400
Total Estimated Operating Costs	$594,575	$713,490
Total Estimated Net Revenue	$4,742,825	$4,623,910
Payback in Years	7.96	9.80
Optimistic		
Total Estimated Capital Costs	$1,888,745	$2,266,494
Total Estimated Revenue	$6,138,010	$6,138,010
Total Estimated Operating Costs	$594,575	$713,490
Total Estimated Net Revenue	$5,543,435	$5,424,520
Payback in Years	6.81	8.36

Sudbury

Request for Decision

LED Streetlight Conversions

Presented To:	Operations Committee
Presented:	Tuesday, Feb 03, 2015
Report Date	Wednesday, Jan 28, 2015
Type:	Presentations

Recommendation

That authority be provided to the General Manager of Infrastructure Services to complete retrofits of all C.G.S. streetlights, subject to a positive business case, as outlined in the report from the General Manager of Infrastructure Services dated January 28,2015 and that;

It is a multi-year program with locations determined by the General Manager of Infrastructure Services and that;

Preliminary estimates to Finance this project in the amounts of $4 million in 2015, $2 million in 2016, and $2 million in 2017 be provided from the Capital Financing Reserve Fund- Roads and that;

Savings from the project be credited back to the Capital Financing Reserve Fund – Roads until the capital investment has been reached and that;

The General Manager of Infrastructure Services be provided the authority to maximize the available per fixture grant in 2015 and that;

Procurement of the contract is to include design, supply and installation of LED fixtures in accordance with the City's Roadway Lighting Policy and Pedestrian Lighting Standards and that;

Staff report back to Operations Committee annually on the progress of the LED Streetlight conversion program.

Signed By

Report Prepared By
Shawn Turner
Manager of Financial & Support Services
Digitally Signed Jan 28, 15

Division Review
David Shelsted
Director of Roads & Transportation Services
Digitally Signed Jan 28, 15

Recommended by the Department
Tony Cecutti
General Manager of Infrastructure Services
Digitally Signed Jan 28, 15

Recommended by the C.A.O.
Doug Nadorozny
Chief Administrative Officer
Digitally Signed Jan 28, 15

Finance Implications

If approved, funding for this project is provided for in the 2015 Capital Budget and 2016-2017 outlook. Annual funding allotments will drawn from the Capital Financing Reserve Fund - Roads. The balance in this reserve fund as of December 31,2014 is $10 million. Approval of this initiative commits $8 million from this reserve fund. Savings generated will be used to pay back the reserve fund until the entire amount is repaid.

Background

The City of Greater Sudbury (CGS) owns all streetlights within the City and electricity is provided through Greater Sudbury Utilities (GSU) or Hydro One Networks Inc. (HONI), depending on the area serviced. GSU also provides technical support, advice, and is contracted to maintain the system including the streetlight inventory database, and the repairs and maintenance of the streetlights.

There are currently 14,627 streetlights within CGS with 60% serviced by GSU and the remaining 40% serviced by HONI. Of the current inventory, approximately 3,000 are LED.

In 2012, CGS Council approved a streetlight retrofit project that resulted in the conversion of 1,315 streetlights from high pressure sodium (HPS) to light emitting diode (LED). Advantages of the project were a reduction in green house gas emission, reduced light pollution and energy savings.

Streetlight Energy

The Ontario Energy Board (OEB) regulates the province's electricity and natural gas sectors. One of its key regulatory functions is approving delivery rates for electricity distribution and transmission, including those for GSU and HONI.

The annual streetlight energy costs have grown significantly over the last 10 years largely due to the cost of electricity. Additionally, a portion of the increase can be attributed to growth in the streetlight network.

The cost of streetlight energy can be broken into two types of charges. There are fixed costs that do not vary based on the amount of electricity consumed. There are also variable charges that are based on the amount of electricity used. The intent of converting streetlights to LED is to reduce the variable portion of the electricity bill.

In 2013, GSU applied for a rate structure that increased the fixed cost per streetlight fixture in order to offset the declining revenues from the 2012 LED conversions.

Use of LED Street Lights

The following are some Ontario municipalities that have started converting their streetlight network from HPS fixtures to LED:

Kingston	10,000 street lights at an estimated cost of $4 million
Markham	12,300 cobra-style street lights in 2012
Mississauga	49,000 street lights started in 2012 at a cost of $26 million.
North Bay	5,600 at a cost of $2.8M
Windsor	23,000 street lights starting in mid-2014 at an estimate cost of $14.3 million

Other large municipalities in the United States have also undertaken large scale LED conversions. However, climate and energy rates vary dramatically which renders comparisons to these projects difficult.

American National Standard Practice for Roadway Lighting (RP-8)

CGS has adopted Pedestrian Lighting Standards for pedestrian road right-of-ways based on the American National Standard Practice for Roadway Lighting (RP-8). The standard provides for a standard of illumination that is considered appropriate and provides a safe level of lighting. Some current lighting levels do not meet the RP-8 standard. Further, straight conversion of some existing HPS to LED may provide less adequate lighting due to the limited dispersion of light with LEDs. The saveONenergy Retrofit Program Ontario incentive is only allowable for the conversion of existing streetlights to their equivalent LED and would not be granted for any improvements.

Current Opportunity

CGS, through GSU, has been pre-approved for an incentive in the combined amount of $1.85 million in order to fund the conversion of existing HPS and low pressure sodium (LPS) streetlights to LED. The incentive is a per fixture rebate defined by the wattage of the bulb being replaced. LEDs are more energy efficient and have a longer useful life than traditional HPS and LPS lights. The saveONenergy Retrofit Program Ontario is offered by the Ontario Power Authority and is only available for streetlights converted by December 31, 2015. The incentive covers a portion of the costs for converting each of the 11,288 HPS and LPS streetlights. Based on the anticipated scope to be completed in 2015, the estimated rebate that can be achieved is in the range of $0.5M to $1.0M.

Objective and Scope

The objective for converting existing HPS and LPS streetlights to LED would be to realize operational savings that exceed the initial capital investment within the useful life of the lights (20 years). In order to benefit from the incentive, lights would need to be installed and verified prior to December 31, 2015. A preliminary business case was developed using estimated capital costs and energy savings. This work indicated that an LED streetlight retrofit has the potential to provide operating savings (energy and maintenance) in excess of the capital cost. At a capital cost of $8M and only considering energy savings, it is expected that the payback period would be approximately 9 years. This does not include maintenance savings and does not take into account lost interest revenue. Upon receipt of competitively procured costs, a final business case will be prepared in order to justify the economics of the project and to ultimately make the decision to proceed.

Converting 11,288 streetlights to LED requires a significant investment of resources in a short amount of time. It is the opinion of GSU and City staff that a project of this size requires a complete turnkey solution including a project manager/consultant responsible for all aspects of the project. This would include assessment, design, supply/storage, installation and removal/disposal of old units.

Lighting design and modeling will be required to assess the lighting levels in advance of carrying out the conversion from HPS/LPS to LED, thus requiring more time and resources. Without this study, some sidewalks & roadways may have reduced lighting levels as HPS disperses light differently than the more directional LED lighting. Where it is practical and reasonable to do so, lighting levels will be brought to RP-8 standards. However, some rural areas are serviced by spot streetlights that illuminate hills, corners, and intersections. These areas will be no brought to RP-8 standards but will undergo LED conversions.

In 2012, the City converted approximately 1,300 streetlights to LED. It is unlikely that the remaining 11,288 streetlights will be able to be replaced by the end of 2015. However, it would be advantageous to complete as many installs as possible in 2015, in order to qualify for the per fixture grant as described above. As a result, the implementation would need to take place over several years with a heavy emphasis on installing as many as possible in 2015.

Risks/ Rewards

As with any large capital project there are risks and rewards. Some of the more significant risks and rewards of converting streetlights to LED are:

Risks

The most significant risk to this project is the possibility of energy savings not being realized. Electricity providers are able to adjust electricity prices and the composition of billing structures twice annually. If the City completes the conversion on the remaining streetlights, there is a risk that GSU and HONI may revise the billing structure to include a higher portion of fixed charges. This would result in the City not achieving the expected financial savings in spite of reduced electricity usage.

Secondly, the useful life of LEDs is estimated by the manufacturer to be 20 years. There is a possibility that LEDs may not last 20 years and/or the "brightness" of LEDs may not be sufficient for the City's lighting needs for the full 20 years. As the analysis of the project will rely on 20 years to justify the economics of the project, a useful life of less than 20 years would jeopardize the case for the project.

Lastly, as with all projects, management of the contract is critical to ensure timelines and budgets are met as expected.

Rewards

Initial review of other LED conversion projects indicate that converting streetlights to LED would result in annual estimated electricity reductions of approximately 37% - 60%. As a result, the City would receive a considerable financial benefit from the conversion. It should be noted that this would not translate into a one for one reduction in financial savings, as there are fixed electricity costs that would not change.

Secondly, there is a positive environmental outcome to the LED conversions such as a reduction in green house gases.

Thirdly, annual maintenance costs are likely to decrease. The average life expectancy of the current HPS streetlights in use is approximately 5 years. The life expectancy of LEDs provided by the manufacture is approximately 20 years. As a result, the LED fixtures would not need to be replaced and serviced as often as the current HPS bulbs.

Lastly, the project supports the CGS Mission Statement of managing the resources efficiently, responsibly and effectively as well as acting today in the interests of tomorrow.

Financing

The Roads division has included draws from reserve in the 2015 Capital Budget and 2016-2017 outlook. As the project is new and estimates are drawn from limited experience in this subject matter, Roads has allocated the following amounts:

2015 - $4 Million,
2016 - $2 Million,
2017 - $2 Million,

These amounts are preliminary estimates and will likely be adjusted as the results from the RFP process are received. There are also largely dependent on the amount of work that the successful bidder is able to do in a given year.

Conclusion

LED streetlight technology has improved significantly in the last few years and LED streetlights are now standard equipment for new City streetlight projects or major road reconstructions.

In order to take advantage of the saveONenergy Retrofit Program Ontario and subject to a positive business case, staff are seeking approval to procure a contract that is to include the design, supply and installation of LED fixtures in accordance with the City's Roadway Lighting Policy and Pedestrian Lighting Standards.

Preliminary estimates to Finance this project in the amounts of $4 million in 2015, $2 million in 2016, and $2 million in 2017 are to be provided from the Capital Financing Reserve Fund- Roads.

Once the business case is finalized and a vendor selected, annually updates will be presented to Council on the progress of the project.

Request for Recommendation

Finance and Administration Committee

Greater | Grand Sudbury
www.greatersudbury.ca

Type of Decision									
Meeting Date	February 11, 2015				Report Date	February 11, 2015			
Decision Requested	x	Yes		No	Priority	x	High		Low
	Direction Only				Type of Meeting	x	Open		Closed

Report Title

LED Streetlight Conversions, Supplementary Report

Budget Impact/Policy Implication

x This report has been reviewed by the Finance Division and the funding source has been identified.

If approved, funding for this project is provided for in the 2015 Capital Budget and 2016-2017 outlook. Annual funding allotments will be drawn from the Capital Financing Reserve Fund – Roads. The balance in this reserve fund as of December 31, 2014 is $10 million. Approval of this initiative commits $8 million from this reserve fund. Savings generated will be used to pay back the reserve fund until the entire amount is repaid.

x **Background Attached**

Recommendation

That authority be provided to the General Manager of Infrastructure Services to complete retrofits of all CGS streetlights, subject to a positive business case, as outlined in the report from the General Manager of Infrastructure Services dated January 28, 2015 and that;

It is a multi-year program with locations determined by the General Manager of Infrastructure Services and that;

Preliminary estimates to finance this project in the amounts of $4 million in 2015, $2 million in 2016, and $2 million in 2017 be provided from the Capital Financing Reserve Fund – Roads and that;

Savings from the project be credited back to the Capital Financing Reserve Fund – Roads until the capital investment has been reached and that;

The General Manager of Infrastructure Services be provided the authority to maximize the available per fixture grant in 2015 and that;

x **Recommendation Continued**

Recommended by the Department

Tony Cecutti
General Manager of Infrastructure Services

Recommended by the C.A.O.

Doug Nadorozny
Chief Administrative Officer

Report Prepared By	Division Review
Tony Cecutti General Manager of Infrastructure Services	

RECOMMENDATION CONTINUED

Procurement of the contract is to include design, supply and installation of LED fixtures in accordance with the City's Roadway Lighting Policy and Pedestrian Lighting Standards and that;

Staff report back to Operations Committee annually on the progress of the LED Streetlight Conversion Program.

BACKGROUND

Please refer to attached supplemental information.

Greater | Grand Sudbury

MEMO

TO: Mayor and Council

FROM: Tony Cecutti, General Manager, Infrastructure Services

CC: Doug Nadorozny, CAO

RE: LED Street Light Retrofit Rebate Opportunity, 2015
Supplement to Staff Report to Operations Committee,
February 3, 2015

DATE: February 10, 2015

Please find attached supplemental information to our February 3, 2015 staff report regarding an opportunity to obtain a rebate from the Ontario Power Authority. The report provides information that is supplementary to our original report, and should be read in conjunction with that information.

Two key requests came out of the discussion at Operations Committee, summarized as follows. Staff was asked to provide any additional information that formed the basis of the numbers in our staff report and substantiated the business case study to date. Secondly staff was asked to provide a summary of the information available to date on the 2012 LED street light retrofit program.

LED Streetlight Project
Supplementary Information

Background

This supplementary information is provided in response to the Operations Committee request on February 3rd, 2014 for additional financial data regarding Light Emitting Diode (LED) streetlights.

In November 2014, the City was advised that it could receive a per fixture rebate for converting current High Pressure Sodium (HPS) streetlights to LED. The amount of the rebate varies depending on the wattage of the bulb being replaced. In aggregate, this rebate is approximately $1.85M if all streetlights were retrofitted to LED. City staff met internally as well as with Greater Sudbury Utilities (G.S.U.) staff and LED providers in an attempt to complete a preliminary business case that would provide sufficient information to suggest that a conversion of this magnitude is feasible and to satisfy staff that it had the potential to be a worthwhile endeavor.

Table 1 below was calculated by City staff in conjunction with G.S.U. staff and indicates the projected energy savings (kWh) if the City were to retrofit all existing streetlights to LED. The total streetlights and energy savings are divided between the two energy distributors based on the number of lights in their respective jurisdiction. As can be seen, the estimated electricity savings are approximately 37%. This analysis is based on replacement of current wattages with equivalent LED wattages. It has been suggested by product providers that some wattages may be able to be reduced upon conversion, thereby increasing the rate of energy savings. However, this would need to be determined through a design of the streetlight network to ensure adequate lighting is provided.

Table 1

Electricity Consumption

	GSU	HONI	Total
Number of Fixtures	6,232	5,056	11,288
Electricity Before Retrofit (kWh)	6,978,431	4,944,943	11,923,374
Estimated Electrity Savings (kWh)	2,496,966	1,942,972	4,439,938
Estimated Energy Reduction	35.80%	39.30%	37.20%

This savings in energy was then translated into a potential cost reduction based on the rates of the City's two energy distributors –G.S.U. and Hydro One Networks Incorporated (HONI). Table 2 below illustrates the expected energy savings based on the above analysis and returns a payback period based on an estimated capital cost.

Table 2

Pay-Back (Years) for Conversion (Estimated)

Estimated Capital Costs	GSU	HONI	Total	
Material Costs	3,000,000	2,000,000	5,000,000	
Installation	1,500,000	1,000,000	2,500,000	
Design	120,000	80,000	200,000	
Management/Contingency	180,000	120,000	300,000	
Total Estimated Capital Cost	**$4,800,000**	**$3,200,000**	**$8,000,000**	
Less: Rebate	$1,109,809	$744,661	$1,854,470	
Net Capital Cost	**$3,690,191**	**$2,455,339**	**$6,145,530**	
Estimated Reduction in Hydro Costs	$285,512	$378,232	$663,744	*
Pay-Back (Years) after Rebate	**13**	**6**	**9**	**

Notes:
*Based on replacement of equivalent wattage LED at current hydro rates.
** Does not include maintenance savings as City currently has a fixed price contract with G.S.U. ending March, 2015. Lost interest revenue is also not included.

Further, preliminary work on this project also reviewed the sensitivity of the project to various capital cost structures. Table 3 below displays the results of this analysis.

Table 3

Sensitivity Analysis

Pay-Back (Years) after Rebate

Realized Capital Cost Scenarios	GSU	HONI	Total
$6M	9	4	6
$8M	13	6	9
$10M	17	9	12
$12M	21	11	15

As is evident in Table 3, the payback period differs among the various energy distributors. This is largely a result of the billing structure at each utility. G.S.U. maintains a higher percentage of their bill devoted

to a fixed charge, whereby HONI charges are proportionately more variable. As a result, savings on energy consumption are more fully translated into financial savings at HONI and in turn reduce the payback period of expended capital.

There are still some issues that remain to be factored in to the above analysis. These include maintenance savings, wattage replacement, confirmed capital cost, number of lights to be replaced and design that would indicate if there are any additional lights needed. This will be dealt with as follows:

Maintenance costs: As the life expectancy of an LED is approximately 4 times longer than an HPS light, it is reasonable to expect some savings in the maintenance of streetlights. Currently, G.S.U. is under a fixed contract to provide maintenance to the entire streetlight network. This contract expires at the end of March, 2015. Staff will be reviewing the requirements to ensure that the City benefits from reduced maintenance to current and future LED conversions.

Wattage replacement, confirmed capital cost and number of lights: These will all be confirmed upon receipt and award of a competitively procured contract.

The business case for this project will be continually updated as the above information is received and evaluated to ensure that the City is receiving an adequate payback on its capital investment.

2012 Experience

At the Operations Committee on February 3rd, 2014 a request for additional information regarding the 2012 LED conversion program was made. Table 4 below summarizes the results of this capital investment. As can be seen, the capital cost was significantly lower than the estimated cost by approximately $200,000 resulting in a reduced cost per fixture after the $245 rebate.

Table 4

2012 Streetlight Conversions-Capital Cost

	Per Report	Actual
# Fixtures	1,315	1,319
Capital Cost	1,250,254	1,050,006
Incentives ($245/fixture)	(322,175)	(323,155)
Net Capital Cost	**928,079**	**726,851**
Cost per Fixture	706	547

Table 5 below depicts the operating results of the 2012 LED conversions. This capital investment has not yielded the expected operating savings in maintenance or energy costs. The expected maintenance savings were not realized as maintenance was already under a fixed contract with G.S.U. and the contract was not successfully renegotiated. Energy costs were not reduced by the expected amount as a result of a change in billing structure at G.S.U. In May, 2013 a revised billing structure which included a large increase in fixed costs reduced potential energy savings by approximately $16,000 in 2013. This structure has been carried forward and reduced anticipated savings by approximately $25,000 in 2014.

These reduced savings result in a payback period of 25 years, assuming $38,572 savings in year one and $28,816 annually after that. Upon successful renegotiation/procurement of a new maintenance contract, the payback period will be revisited and adjusted to reflect savings as a result of these conversions.

Table 5

2012 Streetlight Conversions

		Actual Savings	
	Per Report	**2013**	**2014**
Maintenance Savings	36,729	0	0
Energy Savings	55,000	38,752	28,816
Total Savings	91,729	38,752	28,816
Payback Period	**10.1**		**25**

Summary

In summary, the opportunity to benefit from LED conversions may exist well into the future. However, the City is faced with the opportunity to benefit from an additional rebate program that has the potential to offer an approximate 20-25% discount on the capital cost of replacement. Typically the City will have a more defined case for a project of this magnitude, however there are still a number of issues that need to be dealt with and it was determined that to deal with them sequentially would reduce the ability of the City to maximize the per fixture rebate. These issues already identified include maintenance costs, design of streetlights , number and wattage of replacements achievable in 2015 and dialogue with the City's energy distribution partners in regards to rate structures. This more parallel program of implementation alongside design and analysis is being recommended in order to receive maximum benefit of the rebate program.

APPENDIX A

Marginal Abatement Analysis

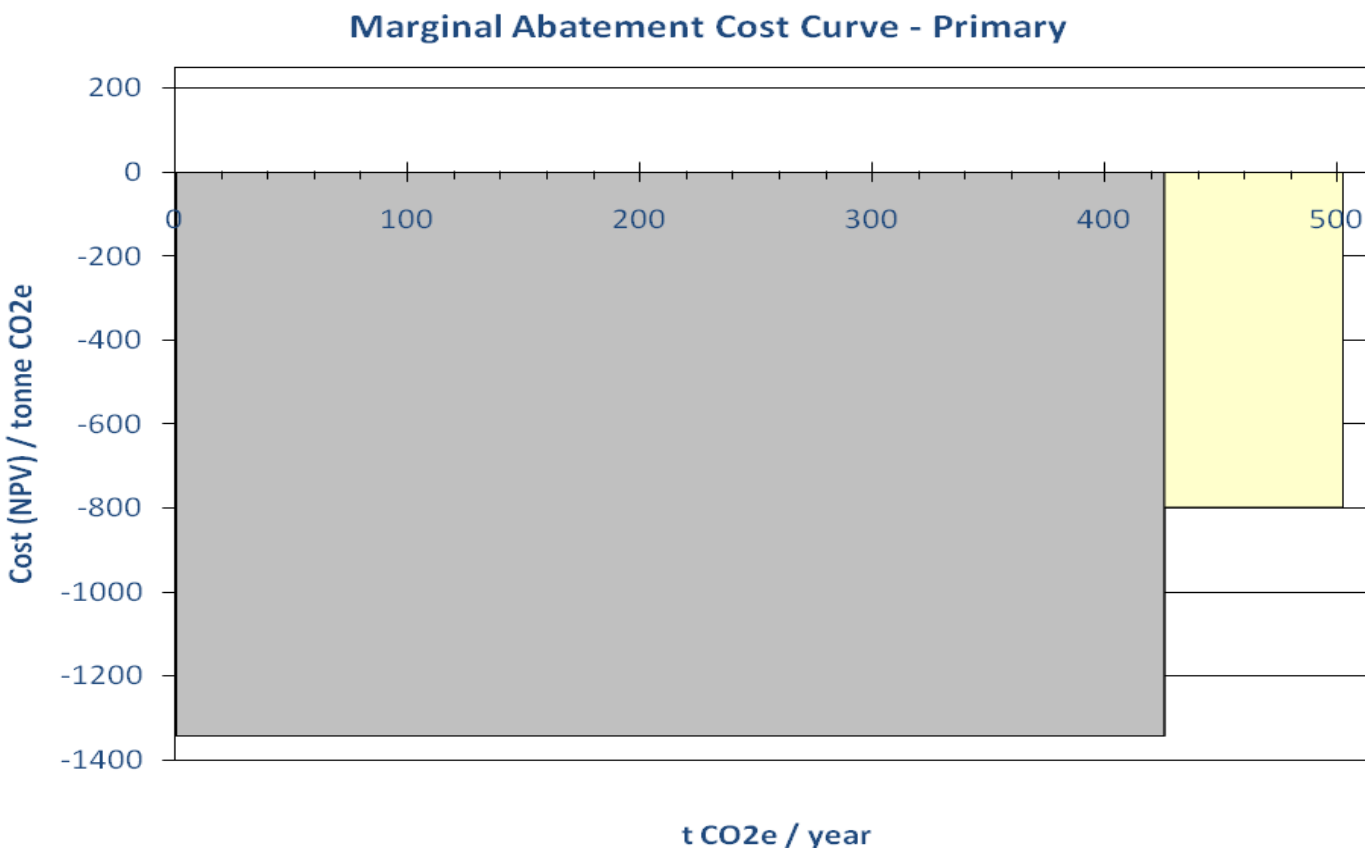
Marginal abatement cost curves are a standard tool used to illustrate the potential for reducing emissions of pollutants such as greenhouse gases from energy initiatives. Marginal abatement cost means the cost to reduce or offset one unit of pollution, in this case one ton of GHG emissions. Marginal abatement cost curves generally show the abatement cost associated with the emissions reductions achievable by different energy efficiency projects at a given point in time. It must be noted that different energy conservation measures with different paybacks and different savings, or avoided costs, will also have different carbon footprint impacts.

The height of the vertical or y-axis of the graph represents each of the potential energy efficiency project abatement costs per MT of (CO_2e), while the horizontal or x-axis represents the total GHG abatement potential or metric tons of carbon dioxide equivalent (CO_2e) per year for each option. The widest block delivers the most abatement potential. The graph is ordered from the lowest (left) to the highest (right) abatement cost opportunities.

Options that appear below the horizontal axis, i.e. the business-as-usual (BAU) baseline, offer the potential for financial savings once the upfront costs of implementing the projects have been factored in. Such initiatives, which offer the most cost savings for reduction in GHG emissions, should be considered first. Options that appear above the horizontal axis offer reductions in GHG emissions but at a net-cost per annum. In our case both projects are below the baseline.

The Marginal Abatement Cost curve tool illustrates only two dimensions (potential and costs) and should not be the only tool used when making energy efficiency investment decisions. A MACC can however be a valuable instrument as a basis for further discussion.

The graph below, based on data shown in the following table, compares the marginal abatement cost of GHG for the Roof-top Solar PV Project against the LED Streetlight Conversion. Seeing that the abatement cost is lower for LED Streetlight project, the project is the most beneficial for the investment.



Project	Capital Cost	Savings kWh/ year	Savings MT of CO^2 per Annum	Abatement Cost /ton CO_2e
Roof-top Solar	$2,000,000	806,000	77.38	-$796.84
LED Streetlights	$8,000,000	4,439,938	426.23	-$1341.45