

Request for Decision

Solar Roof Top Projects Financial Plan

Presented To: City Council

Presented: Tuesday, Jan 27, 2015

Report Date Thursday, Jan 22, 2015

Type: Managers' Reports

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.

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

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Manager of Energy Initiatives
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Division Review

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Recommended by the Department

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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 3rd, 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
Pessimistic (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
Pessimistic (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:

- o Repayment of borrowing from reserve funds
- o 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




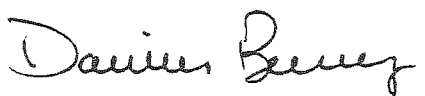
Type of Decision							
Meeting Date		September 9, 2014		Report Date		September 8, 2014	
Decision Requested		Yes	No	Priority		High	Low
		Direction Only		Type of Meeting		Open	Closed

Report Title
Feed-in-Tariff Contract for 3 Rooftop Solar Projects

Budget Impact/Policy Implication	Recommendation
<p>This report has been reviewed by the Finance Division and the funding source has been identified.</p>	<p>For information</p>
<p>Background Attached</p>	<p>Recommendation Continued</p>

Recommended by the Department
<p><i>[Signature]</i> Paul Baskcomb Acting General Manager of Growth & Development</p>

Recommended by the C.A.O.
<p><i>[Signature]</i> Doug Nadorozny Chief Administrative Officer</p>

Report Prepared By	Division Review
 Sajeesh Shivshankaran Manager of Energy Initiatives	 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.

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 proceeding with any project.

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Recommended by the Department
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Acting General Manager of Growth & Development/Planning Director
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Recommended by the C.A.O.
Doug Nadorozny
Chief Administrative Officer
Digitally Signed Oct 2, 13

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

Estimated Energy Produced (kW) per Consultant Report FIT Contract Revenue Rate (kW/h)		TDS		Gerry McCrory Countryside Arena		Pioneer Manor		All 3 Project Sites		All 3 Project Sites Over 20 Years	
		75	With 20% contingency	245	With 20% contingency	245	With 20% contingency	565	With 20% contingency	Total with no contingency at end of 20 years	Total with 20% contingency at the end of 20 years
		No contingency		No contingency		No contingency		No 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	Total Estimated Capital Costs	\$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	Total Estimated Revenue	\$4,536,790	\$4,536,790
Estimated Annual Operating Costs	3,996	4,795	12,754	15,305	12,979	15,574	\$29,729	\$35,674	Total Estimated Operating Costs	\$594,575	\$713,490
Estimated Annual Net Revenue	\$ 27,088	\$ 26,289	\$ 85,123	\$ 82,573	\$ 84,899	\$ 82,303	\$ 197,111	\$ 191,165	Total Estimated Net Revenue	\$3,942,215	\$3,823,300
Payback in Years	11.06	13.68	9.54	11.80	9.15	11.33	9.58	11.86	Payback in Years	9.58	11.86
Margin of Safety for Breakeven Annual Return on Investment	45%	32%	52%	41%	54%	43%	52%	41%			
	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	Total Estimated Capital Costs	\$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	Total Estimated Revenue	\$5,337,400	\$5,337,400
Estimated Annual Operating Costs	3,996	4,795	12,754	15,305	12,979	15,574	\$29,729	\$35,674	Total Estimated Operating Costs	\$594,575	\$713,490
Estimated Annual Net Revenue	\$ 32,574	\$ 31,775	\$ 102,396	\$ 99,845	\$ 102,171	\$ 99,576	\$ 237,141	\$ 231,196	Total Estimated Net Revenue	\$4,742,825	\$4,623,910
Payback in Years	9.20	11.32	7.93	9.76	7.60	9.36	7.96	9.80	Payback in Years	7.96	9.80
Margin of Safety for Breakeven Annual Return on Investment	54%	43%	60%	51%	62%	53%	60%	51%			
	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	Total Estimated Capital Costs	\$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	Total Estimated Revenue	\$6,138,010	\$6,138,010
Estimated Annual Operating Costs	3,996	4,795	12,754	15,305	12,979	15,574	\$29,729	\$35,674	Total Estimated Operating Costs	\$594,575	\$713,490
Estimated Annual Net Revenue	\$ 38,059	\$ 37,260	\$ 119,668	\$ 117,118	\$ 119,444	\$ 116,848	\$ 277,172	\$ 271,226	Total Estimated Net Revenue	\$5,543,435	\$5,424,520
Payback in Years	7.87	9.65	6.79	8.32	6.60	7.98	6.81	8.36	Payback in Years	6.81	8.36
Margin of Safety for Breakeven Annual Return on Investment	61%	52%	66%	58%	67%	60%	66%	58%			
	12.7%	10.4%	14.7%	12.0%	15.4%	12.5%	14.7%	12.0%			