HALIFAX
REGIONAL MUNICIPALITY

PO Box 1749
Halifax, Nova Scotia
B3J 3A5, Canada

**Item No. 11.2.1**
**Halifax Regional Council**
**March 30, 2010**

**TO:** Mayor Kelly and Members of Halifax Regional Council

**SUBMITTED BY:** Councillor Sue Uteck, Chair
Energy and Underground Services Advisory Committee

**DATE:** March 19, 2010

**SUBJECT:** **LED Traffic Signal System Replacement Project**

## ORIGIN

March 19, 2010 meeting of the Energy and Underground Services Advisory Committee.

## RECOMMENDATION

The Energy and Underground Services Advisory Committee recommend Regional Council:

1. Approve a capital expenditure of $830,000 (net HST included) from Capital Account No. CTU00886 - LED Traffic Signal Conversion Project with a net cost to HRM of $605,943 as per the Budget Implications section of the February 15, 2010 staff report in order to fund the completion of the ongoing LED traffic signal replacement project;

2. Approve a budget increase of $224,057 to Capital Account No. CTU00886 - Traffic Signal Conversion Project funded through external cost sharing from NSPI;

3. Approve a transfer of funding in the amount of $211,589 from Capital Account No. CTU01085 - Traffic Signal Installation to Capital Account No. CTU00886 - LED Traffic Signal Conversion Project; and

4. Pre-approve the 2010/11 capital budget for Capital Account No. CTU00886 - LED Traffic Signal Conversion Project in the amount of $300,000; as outlined in the Budget Implications section of the February 15, 2010 staff report.

## BACKGROUND/DISCUSSION

At the March 19, 2010 meeting of the Energy and Underground Services Advisory Committee, staff presented a report which provided an overview of the LED Traffic Signal System Replacement Project. The report noted that the Municipality has 79 intersections remaining to be converted to LED lamps, and discussed the manner in which this project can be funded and moved forward. The Committee endorsed the staff recommendation and has forwarded it to Regional Council for consideration.

## BUDGET IMPLICATIONS

Budget Implications have been addressed in the attached staff report of February 15, 2010.

## FINANCIAL MANAGEMENT POLICIES/BUSINESS PLAN

This report complies with the Municipality's Multi-Year Financial Strategy, the approved Operating, Capital and Reserve budgets, policies and procedures regarding withdrawals from the utilization of Capital and Operating reserves, as well as any relevant legislation.

## ALTERNATIVES

The Energy and Underground Services Advisory Committee did not provide Alternatives. Please refer to the attached staff report for Alternatives.

## ATTACHMENTS

Attachment 'A': Staff report dated February 15, 2010.

A copy of this report can be obtained online at http://www.halifax.ca/council/agendasc/cagenda.html then choose the appropriate meeting date, or by contacting the Office of the Municipal Clerk at 490-4210, or Fax 490-4208.

Report Prepared by: Sheilagh Edmonds, Legislative Assistant

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PO Box 1749
Halifax, Nova Scotia
B3J 3A5, Canada

**Item No.**
**Energy and Underground Services Committee**
**March 19, 2010**

**TO:** Sue Uteck, Chair and Members of Energy and Underground Services Committee

**SUBMITTED BY:** Ken Reashor, P.Eng., A/Director, Transportation and Public Works

**DATE:** February 15, 2010

**SUBJECT:** **LED Traffic Signal System Replacement Project**

## ORIGIN

The Halifax Regional Municipality Regional Plan provides for an Emissions Reduction Functional Plan which identifies programs and methods to reduce the level of GHGs. The GHG Local Action Plan identifies LED traffic signal systems as a measure for consideration.

## RECOMMENDATION

It is recommended that Halifax Regional Council:

1. Approve a capital expenditure of $830,000 (net HST included) from Capital Account No. CTU00886 - LED Traffic Signal Conversion Project with a net cost to HRM of $605,943 as per the Budget Implications section of this report in order to fund the completion of the ongoing LED traffic signal replacement project;

2. Approve a budget increase of $224,057 to Capital Account No. CTU00886 - LED Traffic Signal Conversion Project funded through external cost sharing from NSPI;

3. Approve a transfer of funding in the amount of $211,589 from Capital Account No. CTU01085 - Traffic Signal Installation to Capital Account No. CTU00886 - LED Traffic Signal Conversion Project; and

4. Pre-approve the 2010/11 capital budget for Capital Account No. CTU00886 - LED Traffic Signal Conversion Project in the amount of $300,000; as outlined in the Budget Implications section of this report.

## BACKGROUND

The Halifax Regional Municipality has been active in replacing existing incandescent traffic signal systems for the past four years. Energy savings from the conversion of traffic signal systems from incandescent lamps to LED lamps is approximately 84%. In addition, the life expectancy of the LED lamp is about four times that of the incandescent lamp. However, with the capital cost of the LED lamp exceeding eight times that of the incandescent lamp, a simple payback for such a replacement project exceeds six years. This is significant because the lamps are expected to last seven to eight years.

Due in large part to funding support from Conserve Nova Scotia, HRM has been able to commence its LED traffic signal system replacement program. Through funding from the Province for purchasing traffic signal replacement LED lamps, HRM has been able to convert approximately 137 intersections. As well, the Municipality has installed LED traffic signals in an additional 31 new intersections. Approximately 109 intersections remain to be converted. Of those, HRM has sufficient LED lamps to convert about 30 intersections. This leaves about 79 intersections that require the purchase of LED lamps.

## DISCUSSION

HRM is anxious to complete the conversion of traffic signal systems to LED technology. The energy savings anticipated will amount to about $90,000 annually. In addition, the Municipality is anxious to meet its commitments associated with Conserve Nova Scotia funding support, and install the remaining lamps that were purchased. This will cost approximately $150,000. The remaining 79 intersections will cost approximately $625,000.00 to purchase and install LED lamps. It is anticipated that this work can be completed in 2010.

Nova Scotia Power Inc. is acting as administrator of the 2010 Demand Side Management (DSM) Program which was approved by the Nova Scotia Utility and Review Board in 2009. The Commercial and Industrial Custom Program provides for support for energy efficient programs that municipalities identify as feasible, but are difficult to fully fund. This LED traffic signal system project is considered to be feasible and provides significant energy and capacity reductions, as well as greenhouse gas emissions reductions. NSPI has agreed to provide $224,057.00 in support of this project.

One of the stipulations of the acceptance of Commercial and Industrial Custom Program funds is a requirement to relinquish any ownership rights to potential environmental credits which may be associated with the proposed project. Clause 15.0(i) states:

> " Not withstanding the above, the Administrator holds sole rights to any electric system capacity credits and environmental credits that may be associated with measures for which incentives were received, ..."

HRM has argued before the NSUARB that this clause was not reasonable in its application, because it did not take into consideration the extent to which project proponents contributed to their own projects. However, the Board sided with the DSM Program Administrator, stating that this approach provided a greater benefit to all rate payers by reducing the impact of potential emissions restrictions on the power utility. As a result, HRM considers that the incentive significantly outweighs any potential benefit from GHG credits, and would like to move forward with the project with the assistance being offered through the DSM funding incentive.

## BUDGET IMPLICATIONS

The total project cost is $830,000 (net HST included) with a net cost to HRM of $605,943. Nova Scotia Power Inc. will contribute $224,057 through its Commercial and Industrial Custom DSM program. Budget availability has been confirmed by Financial Services.

**Budget Summary:**

**Capital Account No. CTU00886 - LED Traffic Signal Conversion Project**

| | |
|---|---|
| Cumulative Unspent Budget | $ 94,354 |
| Add: External Cost Sharing (NSPI) | $ 224,057 |
| Add: Budget Preapproval (2010/11) | $ 300,000* |
| Add: Transfer from CTU01085 | $ 211,589 |
| Balance | $ 830,000 |

**Capital Account No. CTU01085 - Traffic Signal Installation**

| | |
|---|---|
| Cumulative Unspent Budget | $ 921,168 |
| Less: Transfer to CTU00886 | $ 211,589 |
| Balance | $ 709,579 |

*As per the "Advanced Funding for the 2010/11 Capital Budget" information report delivered to Council February 16, 2010, CTU00886 - LED Traffic Signal Conversion Project had received $150,000 of advanced funding. The above request will bring the total advanced funding budget to $300,000 which represents the total planned budget for 2010/11.

## FINANCIAL MANAGEMENT POLICIES/BUSINESS PLAN

This report complies with the Municipality's Multi-Year Financial Strategy, the approved Operating, Capital and Reserve budgets, policies and procedures regarding withdrawals from the utilization of Capital and Operating reserves, as well as any relevant legislation. If approved, there will be an increase to the gross capital budget but not the net.

## ALTERNATIVES

Regional Council may choose to decline the incentive funding but this option is not recommended. This will result in a much slower conversion process and the payback period will increase.

## ATTACHMENT

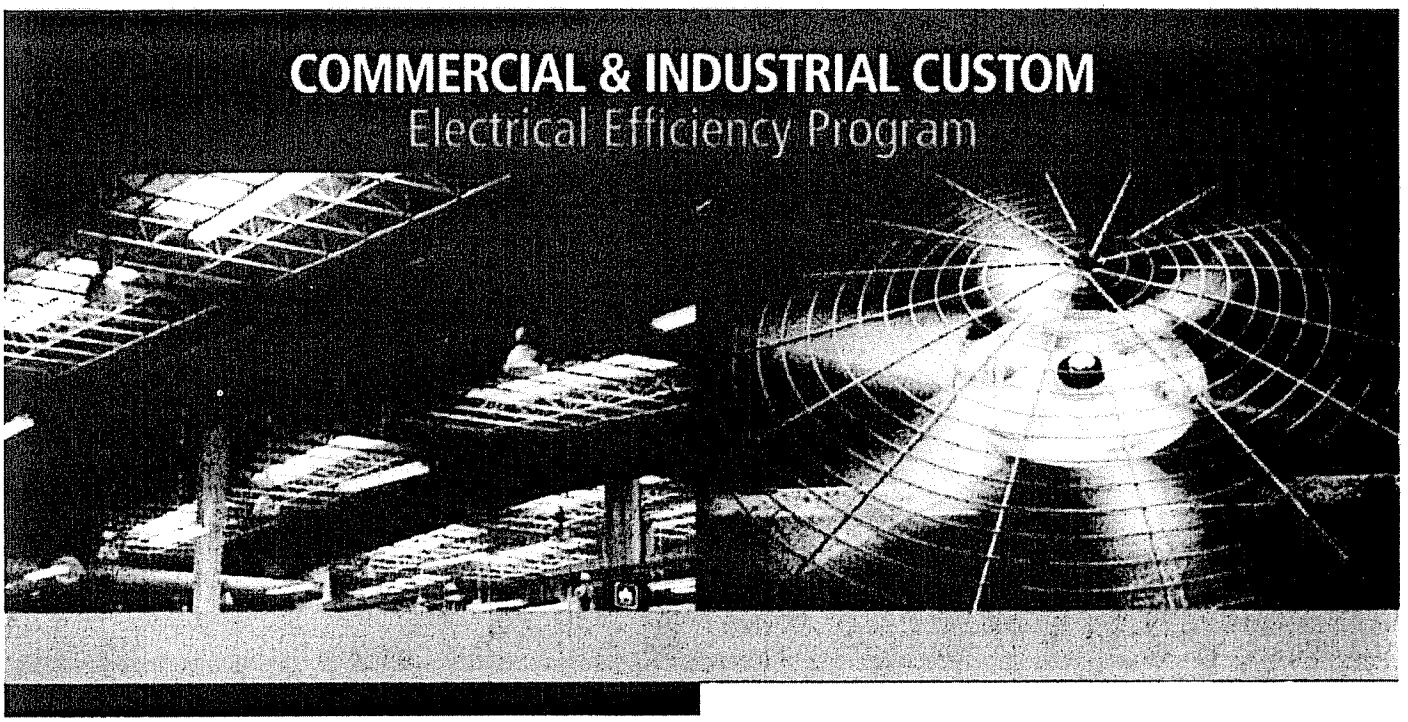
LED Traffic Signals Conversion Project Development Agreement

A copy of this report can be obtained online at http://www.halifax.ca/council/agendasc/cagenda.html then choose the appropriate meeting date, or by contacting the Office of the Municipal Clerk at 490-4210, or Fax 490-4208.

Report Prepared by: Angus Doyle, P.Eng., Manager, Utilities Coordination, 490-5019

Report Approved by: Taso Koutroulakis, P.Eng., A/Manager, Traffic and Right of Way, 490-4816

Financial Approval by: Cathie O'Toole, CGA, Director of Finance, 490-6308




# Project Development Agreement

| | |
|---|---|
| **Customer:** | Halifax Regional Municipality |
| **Project:** | LED Traffic Signals Conversion |
| **NSPI Project #:** | C-764959-2 |
| **Contract Date:** | February 1st, 2010 |
| **NSPI Representative:** | Jeff Knapp, P. Eng.<br>C&I Custom Program Lead<br>Phone: (902) 428-6218 |
| | David Corning<br>C&I Custom Project Manager<br>Phone: (902) 428-6219 |

NOVA SCOTIA POWER
An Emera Company

## Project Development Agreement
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# Project Development Agreement

## STANDARD PROJECT DEVELOPMENT AGREEMENT TERMS AND CONDITIONS

Project Development Agreement ("Agreement") BETWEEN NOVA SCOTIA POWER INC. ("the Administrator") and Halifax Regional Municipality ("the Customer"), made the 20th day of January, 2010, in Halifax, Nova Scotia. Administrator and Customer may be individually referred to as a "Party" and collectively as the "Parties."

APPROVED AS TO FORM
Municipal Solicitor

### Figure 1: Customer and Project Information

| Customer | Project |
|---|---|
| **Customer Name:** Halifax Regional Municipality | **Project Name:** LED Traffic Signals Conversion |
| **Customer Mailing Address:** P.O. Box 1749<br>Halifax, Nova Scotia<br>B3J 3A5 | **Administrator Project Number:** C-764959-2 |
| **Customer Contact Name:** Angus Doyle, P. Eng. | **Project Start Date:** February 1st, 2010 |
| **Customer Contact Title:**<br>Manager of Utilities Coordination | **Project Completion Date:** September 1st, 2010 |
| **Customer Phone:** (902) 490-5019 | **Project Site (if different from mailing address):** 109 Intersections throughout HRM |
| **Customer Email:** doylean@halifax.ca | |
| **Customer Facsimile:** (902) 490-6727 | |

### Figure 2: Incentive Payee Information (if not Customer)

| | |
|---|---|
| Company Name: **(see above)**<br>Company Address | Contact Name<br>Phone |

### Figure 3: Measures Included in Project

| Facility Name | Measure Description | Peak Electrical Demand Savings (kW or kVA) | Electrical Energy Savings (kWh per year) | ANNEX A Reference |
|---|---|---|---|---|
| Halifax Regional Municipality | Traffic Signals Conversion | 186 kW | 1,627,047 kWh | Feasibility Study Data Sheets |
| **Total Projected Annual Electrical Energy Savings** | | **186 kW** | **1,627,047 kWh** | |

### Figure 4: Incentive Payment Schedule

| Project Milestone | Maximum Incentive Amount Payable (CAD$) |
|---|---|
| Implementation Incentive (*Upon 50% project completion*) | **$122,028** |
| Implementation Incentive (*Upon Administrator acceptance of Project completion*) | **$122,029** |
| **Maximum Total Incentive** | **$244,057** |

### Figure 5: Documents Incorporated By Reference

| Name | Date |
|---|---|
| ANNEX A: Feasibility Study Report | November, 2009 |

**WHEREAS** the Customer has applied for financial assistance from the Administrator, in the form of incentives through the Commercial and Industrial Custom Program ("Program") for the Project as set out herein.

1.0 **DEFINITIONS:**

"Business Day" shall mean a day other than a Saturday or Sunday on which the banks are open for business in the Province of Nova Scotia;

"Electric Energy Conservation Measures" shall mean the procurement, installation, commissioning and operation of new, unused equipment that is intended to reduce electrical energy consumption and electrical demand at Project Site;

"HST" shall mean the harmonized sales tax eligible pursuant to the Excise Tax Act (Canada);

"Maximum Total Incentive" shall mean the amount specified as "Maximum Total Incentive" in Figure 4 as may be adjusted in accordance with Section 6;

"Measures" shall mean the measures as specified in Figure 3 herein;

"Payee" shall mean the payee designated by the Customer in Figure 2 herein;

"Project" shall mean the project as specified in Figure 1 herein;

"Project Completion Date" shall mean the date specified as "Project Completion Date" in Figure 1 herein;

"Program Implementation Incentive Claim Form" shall mean the an application form, provided by Administrator and completed by Customer, that states Project status and defines the Project costs for which payment of an Implementation Incentive is being requested.

"Project Milestone" shall mean a the completion of a specific Project activity, such as Implementation of a Measure or Measures, Project commissioning, and others as defined by this Agreement or by the documents incorporated by reference;

"Project Site" shall mean shall mean the Project Site as specified in Figure 1 herein;

"Project Start Date" shall mean the date specified as "Project Start Date" in Figure 1 herein.

2.0 **DOCUMENTS INCORPORATED BY REFERENCE**: The documents listed in Figure 5 are hereby incorporated by reference and made part of this Agreement as ANNEX A.

3.0 **ELIGIBILITY:** Program funding is limited and will be allocated by the Administrator in a manner that best serves the interests of the Program. Funds will be reserved for an approved Project, as described herein, only upon execution of this Agreement by both Parties. Proposed Projects must meet the following requirements to be eligible for approval and payment of Program Incentives ("Incentives"): (1) The Project Site must be a commercial or industrial facility now or to be located within the Administrator's service territory. (2) Projects must be for Electrical Energy Conservation Measures. (3) Electrical energy and demand savings from Project can not exceed the actual usage provided by the electric utility directly or indirectly serving the Project Site. Non-utility supply, such as cogeneration, self-generation or deliveries from another commodity supplier, does not qualify as usage from the utility. (4) Projects must meet all other Program requirements, terms and conditions contained herein.

4.0 **SUBMITTAL REQUIREMENTS FOR INCENTIVE PAYMENT APPROVAL:** The Customer must submit the documents described below in order to be eligible for Incentive payments. Required documents include: (1) Complete engineering calculations to demonstrate energy and demand savings and documentation, if applicable; (2) Schematic drawings and/or manufacturer specification sheets ("cut sheets"), if applicable; (3) Any other documents related to the Project, Project Site, Measures, energy savings or other information deemed necessary by the Administrator to adequately review the payment request.

5.0 **INSPECTIONS:** The Customer must provide the Administrator with reasonable access to the Project and Project Site for all inspections, including: (1) Pre-installation inspection to verify the existing/baseline equipment; (2) Post-installation equipment inspection and (3) Inspection for any other reason that the Administrator deems necessary.

6.0 **PAYMENTS:** The Maximum Total Incentive is defined in Figure 4 and will be paid to the Payee in accordance with the schedule listed in Figure 4, pursuant to the terms and conditions of this Agreement:

6.1 Upon completion of Project or a Project Milestone, the Customer must request payment of Implementation Incentive by submitting the Program Implementation Incentive Claim form provided by the Administrator. Request for final Incentive payment must include project measurement and verification results pursuant to ANNEX A.

6.2 After all required documents have been approved, and the appropriate inspection(s) have been completed, the Administrator will approve the applicable Incentive Payment. Incentive payments will be paid by cheque issued to Payee, within 45 days of approval.

6.3 The Administrator retains sole discretion to determine the appropriate baseline values and energy savings calculations used to determine Incentive payments The Administrator reserves the right to modify or cancel the Incentive amount if the actual Project installed differs from the

installation described in Figure 3 and ANNEX A, if the installation was not consistent with generally accepted engineering practices, or if the actual Project costs are lower than estimated.

6.4 The Administrator reserves the right to modify payment of the Incentive amount if the actual Project annual electrical energy savings as determined using the measurement, verification and analysis methodologies pursuant to ANNEX A (the "Actual Annual Electrical Energy Savings"), are less than 85% of the Total Projected Annual Electrical Energy Savings defined in Figure 3. In such event, the Maximum Total Incentive for Project shall be adjusted by prorating as follows:

Adjusted Maximum Total Incentive Paid ($) =

$$\text{Maximum Total Incentive (\$, Figure 4)} \times \frac{\text{Actual Annual Electrical Energy Savings (kWh per year)}}{\text{Total Projected Annual Electrical Energy Savings (kWh per year)}}$$

The Administrator may require the Customer to return any Incentive payments that the Administrator, at its sole discretion and based on the Adjusted Maximum Total Incentive, determines constitute overpayments for actual savings achieved by the project.

6.5 The Customer may authorize payment of the Incentives to a third party Payee, as defined in Figure 2. Such authorization is at the Customer's sole discretion and the Customer may revoke or modify the authorization at any time by providing advance written notification to the Administrator. The Administrator shall not be responsible for any amounts paid to a Payee prior to the receipt by the Administrator of such notice. Should a dispute arise regarding the authorization, the most recently dated written communication or authorization shall govern.

6.6 If Customer fails to advise the Administrator that Project is complete, or fails to provide required post-installation documentation as described elsewhere in these terms and conditions, within 60 days of Project Completion Date, Payee may be denied incentive payment.

7.0 **PAYMENT DISQUALIFICATION:** Any Incentives to be repaid to the Administrator, in whole or in part, shall be paid as follows:

7.1 If (1) the Project does not provide the Administrator with the related benefits specified in the Application for a period of three (3) years from the Project Completion Date, or (2) the energy benefit to the Administrator ceases in any way, including but not limited to the Customer and/or the Project Site ceases to receive electricity service directly or indirectly from Nova Scotia Power Inc., the measure, equipment and/or Project ceases to function, or the Customer ceases the use of the equipment, Measure or Project Site, the Customer shall refund to the Administrator any prorated amount of the Incentive that the Administrator determines must be repaid, in its sole discretion, based on the actual period of time for which the Customer provided the energy benefit.

7.2 The Customer shall repay any amounts due to the Administrator within ninety (90) calendar days of receipt of notification from the Administrator. The Administrator shall be entitled to set off against payments owed to the Customer any amount due to the Administrator that remains unpaid one hundred and twenty (120) calendar days after the demand for payment.

8.0 **PERMITS AND LICENSES:** The Customer, at its own expense, shall obtain and maintain, or direct its contractors to obtain and maintain licenses and permits required by any relevant governing or regulatory bodies to perform its work. A failure to maintain necessary licenses and permits constitutes a material breach of the Customer's obligations under this Agreement.

9.0 **REMOVAL OF EQUIPMENT:** The Customer agrees, as a condition of participation in the Program, to remove, disable and dispose of the equipment being replaced by the Measures in accordance with all laws, rules, and regulations. The Customer agrees not to reinstall any of this equipment anywhere in the Province of Nova Scotia, or transfer it to any other party for installation in the Province of Nova Scotia.

10.0 **REVIEW AND DISCLAIMER:** THE ADMINISTRATOR'S AND/OR ITS CONSULTANTS' REVIEW OF THE DESIGN, CONSTRUCTION, OPERATION OR MAINTENANCE OF THE PROJECT OR ENERGY EFFICIENCY MEASURES SHALL NOT CONSTITUTE ANY REPRESENTATION AS TO THE ECONOMIC OR TECHNICAL FEASIBILITY, OPERATIONAL CAPABILITY, OR RELIABILITY OF THE PROJECT OR MEASURES, NOR SHALL THE CUSTOMER, IN ANY WAY, MAKE SUCH A REPRESENTATION TO A THIRD PARTY. THE CUSTOMER IS SOLELY RESPONSIBLE FOR THE ECONOMIC AND TECHNICAL FEASIBILITY, CONSTRUCTION, OPERATIONAL CAPABILITY AND RELIABILITY OF THE CUSTOMER'S PROJECT AND MEASURES. THE ADMINISTRATOR MAKES NO WARRANTY, WHETHER STATUTORY, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR ANY PARTICULAR PURPOSE, USE OR APPLICATION.

11.0 **TERM OF AGREEMENT:** The term of this Agreement shall commence on the last date that a Party executes this Agreement and shall run for a period of three (3) years unless earlier terminated pursuant to the terms of this Agreement. Notwithstanding the forgoing the Parties may mutually agree in writing to extend the term of Agreement.

12.0 **ASSIGNMENT:** The Customer consents to the Administrator's assignment of all of the Administrator's rights, duties and obligations under this Agreement. Such assignment shall relieve the Administrator of all rights, duties and obligations arising under this Agreement. Other than the Administrator's assignment, neither Party shall assign its rights or delegate its duties without the prior written consent of the other Party, except in connection with the sale or merger of a substantial portion of its properties. Any such assignment or delegation without written consent shall be null and void. Consent to assignment shall not be unreasonably withheld. If an assignment is requested by Customer, Customer is obligated to provide additional information if requested by the Administrator.

13.0 **ADVERTISING, MARKETING AND USE OF PARTY NAMES:** The Customer shall not use the Administrator's corporate name, trademark, trade name, logo, identity or any affiliation for any reason without the Administrator's prior written consent. The Customer shall make no representations to its customers on behalf of the Administrator. The Administrator may wish to publicize information relating to the Customer's participation in the program, including such data as: projected project energy savings, the incentive amount, and other information that does not compromise reasonable Customer

expectations of confidentiality of proprietary or competitive information. In such instances, the Administrator will obtain Customer permission to make such information public.

14.0 **TAXES:** Incentives received by the Payee may be taxable by the federal, provincial, and local government. The Payee is responsible for declaring all Incentives and paying all such taxes. The Administrator will not be responsible for any tax liability imposed on Payee or Customer as a result of any Incentive given pursuant to this Agreement. Payee may not request Incentive payment toward any tax amounts for which the Customer is or will be exempt from payment or is eligible for a refund.

15.0 **ELECTRIC SYSTEM CAPACITY CREDITS AND ENVIRONMENTAL CREDITS:** Measures purchased and installed in part through Incentives provided by the Program are the property of the Customer, subject to any limitations contained within these Terms and Conditions.

(i) Not withstanding the above, the Administrator holds sole rights to any electric system capacity credits and environmental credits that may be associated with Measures for which incentives were received, and the Administrator can dispose of these credits in any manner authorized by law or regulation.
(ii) In no event shall activity associated with any energy or environmental credits noted in Section 15.0(i) result in interference with the Customer's sole discretion to operate Measures as described in ANNEX A.

16.0 **INDEMNIFICATION:** The Customer shall indemnify, defend and hold harmless, and release the Administrator, its affiliates, subsidiaries, parent companies, officers, directors, agents and employees, from and against all claims, demands, losses, damages, costs, expenses, and liability (legal, contractual, or otherwise), which arise from or are in any way connected with any:

(i) injury to or death of persons, including but not limited to employees of the Administrator or the Customer;
(ii) injury to property or other interests of the Administrator, Customer, or any third party;
(iii) violation of local, provincial, or federal common law, statute, or regulation, including but not limited to environmental laws or regulations; or
(iv) strict liability imposed by any law or regulation; so long as such injury, violation, or strict liability (as set forth in (i) - (iii) above) arises from or is in any way connected with the Customer's performance of, or failure to perform, this Agreement, however caused, regardless of any strict liability or negligence of the Administrator whether active or passive, excepting only such loss, damage, cost, expense, liability, strict liability, or violation of law or regulation that is caused by the sole negligence or wilful misconduct of the Administrator, its officers, managers or employees.

17.0 The Customer acknowledges that any claims, demands, losses, damages, costs, expenses, and legal liability that arise out of, result from, or are in any way connected with the release or spill of any legally designated hazardous material or waste as a result of the work performed under this Agreement are expressly within the scope of this indemnity, and that the costs, expenses, and legal liability for environmental investigations, monitoring, containment, abatement, removal, repair, cleanup, restoration, remedial work, penalties, and fines arising from strict liability, or violation of any local, state, or federal law or regulation, attorney's fees, disbursements, and other response costs incurred as a result of such releases or spills are expressly within the scope of this indemnity.

18.0 The Customer shall, on the Administrator's request, defend any action, claim or suit asserting a claim that may be covered by this indemnity. The Customer shall pay all costs and expenses that may be incurred by the Administrator in enforcing this indemnity, including reasonable attorney's fees. This indemnity shall survive the termination of this Agreement for any reason.

19.0 If this Agreement is assigned pursuant to Section 12.0, the Customer agrees that this indemnification shall continue to apply to the Administrator and shall apply to the assignee.

20.0 **CONFIDENTIALITY**: The Customer hereby agrees to keep in strictest confidence and not use on behalf of or disclose to any third party any Confidential Information (as defined below) disclosed to the Customer during the course of this Agreement. Such Confidential Information may be disclosed only to such directors, officers, employees, consultants and agents of the Customer (collectively "Representatives") who require access to such information for the purpose for which it was disclosed. It is understood that (i) such Representatives will be informed by the Customer of the confidential nature of the Confidential Information and shall be required to adhere to the terms of this Agreement by the Customer and (ii) in any event, the Customer shall be responsible for any breach of this Agreement by any of its Representatives.

21.0 "Confidential Information" means all information, regardless of the form in which it is communicated or maintained (whether oral, written, electronic or visual) and whether prepared by the Administrator or otherwise, which is disclosed to the Customer or its Representatives, ~~including~~ but not ~~limited to~~ the amount of financial assistance that is being provided by the Administrator to the Customer and includes all reports analyses, notes, memoranda, contracts, commercial arrangements, intellectual property, trade secrets, corporate strategies, business plans or other information that are based on, contain or reflect any such Confidential Information.

22.0 The Recipient will if directed by the Company return or, at Company's direction, otherwise destroy all written material, memoranda, notes, copies, excerpts and other writing or recordings whatsoever prepared by the undersigned based upon, containing or otherwise reflecting the Confidential Information.

23.0 **TERMINATION OF AGREEMENT:** If the Customer has either: (a) not engaged in installation of the approved project, (b) not applied for and been granted a Project extension in writing by NSPI prior to the Project Start Date, or (c) breached any of its obligations pursuant to this Agreement including but not limited to its obligations under Section 9, the Administrator may terminate this Agreement without notice and without any liability whatsoever to the Customer. The Administrator may cease Incentive payments, require the return of Incentive payments, and/or terminate this Agreement if the Project is not installed and fully operational ,and the Customer has not received, as appropriate, final drawings, operation and maintenance manuals, and operator training by Project Completion Date.

24.0 **LIMITATION OF LIABILITY:** The Administrator shall not be liable for any special, incidental, indirect, or consequential damages, including without limitation, loss of profits or commitments to subcontractors, and any special, incidental, indirect or consequential damages incurred by the Customer.

25.0 **WRITTEN NOTICE:** Any written notice, demand or request required or authorized in connection with this Agreement shall be deemed properly given if delivered in person or sent by facsimile, nationally recognized overnight courier, or first class mail, postage prepaid, to the address specified below, or to another address specified in writing by the Administrator.

**ADMINISTRATOR**

Nova Scotia Power Inc.
PO Box 910
Halifax, Nova Scotia Canada B3J 2W5
Attention: Corporate Secretary
Fax: (902) 428-6066

WITH A COPY TO:
Nova Scotia Power Inc.
P.O. Box 910
Halifax, Nova Scotia Canada B3J 2W5

Attention: Manager, Conservation and Efficiency
Fax: (902) 428-6066

**CUSTOMER**

As defined in Figure 1.

Notices shall be deemed received (a) if personally or hand-delivered, upon the date of delivery to the address of the person to receive such notice if delivered before 4:30 p.m., or otherwise on the Business Day following personal delivery; (b) if mailed, three Business Days after the date the notice is postmarked; (c) if by facsimile, upon electronic confirmation of transmission, followed by telephone notification of transmission by the noticing Party; or (d) if by overnight courier, on the Business Day following delivery to the overnight courier within the time limits set by that courier for next-day delivery.

26.0 **CONFLICTS BETWEEN TERMS:** Should a conflict exist between the main body of this Agreement and the documents incorporated by reference, the main body of this Agreement shall control. Should a conflict exist in the documents incorporated by reference, the documents shall control in the order listed in Figure 5. Should a conflict exist between an applicable federal, provincial, or local law, rule, regulation, order or code and this Agreement, the law, rule, regulation, order or code shall control. Varying degrees of stringency among the main body of this Agreement, the documents incorporated by reference, and laws, rules, regulations, orders, or codes are not deemed conflicts, and the most stringent requirement shall control. Each Party shall notify the other immediately upon the identification of any conflict or inconsistency concerning this Agreement

27.0 **MISCELLANEOUS:** This Agreement shall at all times be subject to such changes or modifications by the Nova Scotia Utility and Review Board as it may from time to time direct in the exercise of its jurisdiction. This Agreement shall be governed and construed in accordance with the laws of the Province of Nova Scotia, without regard to its conflict of laws provisions. If any provision of this Agreement shall be held by a court of competent jurisdiction to be illegal, invalid or unenforceable, the remaining provisions shall remain in full force and effect. This Agreement constitutes the entire agreement and understanding between the Parties as to the subject matter of this Agreement (other than any Agreement for Project financing, if applicable) and supersedes all prior agreements, representations, writings and discussions between the Parties, whether oral or written, with respect to the subject matter hereof. No amendment, modification or change to this Agreement shall be binding or effective unless expressly set forth in writing and signed by the Administrator's representative authorized to execute the Agreement.

28.0 **PROJECT FINANCING:** Terms and conditions for Project financing, if applicable, are detailed under a separate agreement between Customer and Administrator.

29.0 **SURVIVAL AND ENUREMENT:** All provisions of this Agreement which by their express terms or nature are continuing shall survive expiration or termination of this Agreement, including this provision, the provisions of Sections 7 and 15 and any provisions relating to indemnification, termination, as well as any provisions which are required to determine, or which exclude or limit, any liability or which are otherwise required to give effect to or interpret any such provisions which are continuing.

30.0 **FURTHER ASSURANCES:** The Customer will, from time to time, do, execute and deliver or shall cause to be done, executed and delivered all such further acts, documents or other instruments as may reasonably be requested by the Administrator in order to cure any defects in the execution and delivery of or to comply with or accomplish the covenants and agreements contained in this Agreement.

**IN WITNESS WHEREOF**, the Parties hereto have caused this Agreement to be executed by their duly authorized representatives as of the first date set forth above.

**Customer:**

Signature

Dan English, CAO

Name (print)

February 22, 2010

Date (yyyy/mm/dd)

**Administrator:**

Signature

Alan Richardson
VP Integrated Customer Services

Name (print)

2010/02/08

Date (yyyy/mm/dd)

# Feasibility Study Summary

NOVA SCOTIA POWER
An Emera Company

COMMERCIAL & INDUSTRIAL CUSTOM PROGRAM

# FORM 3
## Feasibility Study Summary

### Customer Information

| | |
|---|---|
| Customer name: | Halifax Regional Municipality |
| NSPI Account number: | Various |
| NSPI Customer number: | C-764959-2 |
| Address Line 1: | P.O. Box 1749 |
| Address Line 2: | |
| City/Town: | Halifax, Nova Scotia |
| Postal Code: | B3J 3A5 |
| Customer contact name: | Angus Doyle, P.Eng. |
| Customer contact title: | Manager of Utilities Coordination |
| Phone (primary): | (902) 490-5019 |
| Phone (secondary): | |
| Email: | doylean@halifax.ca |
| Facsimile: | (902) 490-6727 |

### Engineer Information

| | |
|---|---|
| Engineer name: | As above |
| Employer | |
| Address Line 1: | |
| Address Line 2: | |
| City/Town: | |
| Postal Code: | |
| Phone (primary): | |
| Phone (secondary): | |
| Email: | |
| Facsimile: | |

### Facility Information

| | |
|---|---|
| Facility name: | 109 Traffic intersections |
| Facility location: | Various locations throughout Halifax Regional Municipality |

NOVA SCOTIA POWER

COMMERCIAL & INDUSTRIAL CUSTOM PROGRAM

FORM 3
Feasibility Study Summary

## Project Information

Project name: Traffic Signals Conversion

Project number: C-764959-2

Project description: Conversion of traffic lights from incandescent to LED

Customer simple payback or hurdle rate for conservation projects: Funding

**Explain why this project will not proceed without an incentive from NSPI:**

Due to budgeting concerns, customer requires $244,057 incentive to go ahead with project.

## Current Equipment/ System or Base Case Information

**Current equipment/ system or base case:** Incandescent system

Size: 20 signal heads, containing 55 lamps per intersection

Model #:

Quantity: 109 intersections total

Remaining service life (years):

Output capacity: 1,872 W / intersection = 204,048 W total

Annual energy use (kWh): 16,399 kWh / intersection = 1,787,460 kWh total

Operation hrs/year: 8,760 hr

Variation in loading (if any):

Efficiency (%):

## Proposed Equipment/ System or Energy Efficient Case Information

**Proposed Equipment/ System or energy efficient case:** LED system

Size: 20 signal heads, containing 44 lamps per intersection

Model #:

Quantity: 109 intersections total

Service life (years):

Output capacity: 168 W / intersection = 10,755 W total

Annual energy use (kWh): 1,472 kWh / intersection = 160,413 kWh total

Operation hours/year: 8,760 hr

Variation in loading (if any):

Efficiency (%):

Degradation of efficiency:

NOVA SCOTIA POWER An Emera Company

COMMERCIAL & INDUSTRIAL CUSTOM PROGRAM

# FORM 3
## Feasibility Study Summary

### Measure Costs Information

| | |
|---|---|
| Engineering: | $50,000.00 |
| Materials: | $231,021.00 |
| Installation: | $545,000.00 |
| In-house labour: | |
| Other: | |
| HST: | |
| Total incentives and rebates from non-NSPI sources: | |
| **Total eligible measure costs:** | $826,021.00 |

### Additional Cost Information

In-house labour hours:

In-house labour rate:

Description of "Other" costs:

HST registration number (if HST applied):

### Measure Savings Information

| | |
|---|---|
| Demand savings (kVA): | 186.00 |
| Energy savings (kWh/year): | 1,627,047 |
| Electricity cost savings (per year) | $129,335.00 |

### Non-Electric Benefits

| | |
|---|---|
| Total non-electric savings (Per Year): | $36,999.00 |
| Description of non-electric savings: | O&M costs will be reduced due to the longer life rating of the LED lamps |

### Implementation Schedule

| | |
|---|---|
| Start date: | 01-Feb-10 |
| Dmc c' sd9 | 01-Sep-10 |

NOVA SCOTIA POWER

COMMERCIAL & INDUSTRIAL CUSTOM PROGRAM

**FORM 3**
Feasibility Study Summary

## Financing information

| | | |
|---|---|---|
| Financing requested? | Yes ◯ | No ◉ |
| Amount of on-bill financing requested: | | |
| Term of on-bill financing (months): | | |

## Notes:

See the Feasibility Study Data Sheet for a complete savings breakdown.

# Feasibility Study Report

Please note, this feasibility study was conducted in December of 2008. Since that time the scope of the project has changed.

A more comprehensive and up-to-date set of energy and cost savings calculations were submitted in November of 2009. These numbers were used to obtain the results outlined in the Project Development Agreement (Tab 1). They can be found in Appendix B: Energy Savings Calculations and Cost Estimates (Tab 5).

# Halifax Regional Municipality

# Feasibility Study for LED Traffic Signal System Conversion

**December 01, 2008**


Prepared by:

**Angus Doyle, P. Eng.,**
**Halifax Regional Municipality**
PO Box 1749
Halifax, NS. B3J 3A5

Phone: (902) 490-5019
Fax: (902) 4906727-8888
E-Mail doylean@halifax.ca

# 1 Project Information

The Halifax Regional Municipality is the largest municipality in the Province of Nova Scotia. The urban core incorporates the former cities of Halifax and Dartmouth and the communities of Bedford and Sackville. This project intends to replace the 174 traffic control systems which continue to use incandescent lamp technology, with a more energy efficient LED lamp technology.

Based on the findings of this study, an Implementation Incentive of $526,000 from NSPI will reduce the higher cost of the more efficient LED lamp to an amount meeting an acceptable simple payback of four years.

# 2 Measure Description

## 2.1. Existing Conditions

HRM has a total of 248 traffic signal systems. 74 of these have been installed/converted to LED lamps from the conventional incandescent lamp. 174 systems remain to be converted. Of these, HRM has purchased, through funding from Conserve Nova Scotia/NS Department of Energy, sufficient replacement lamps to upgrade an additional 95 intersections. This leaves 79 complete systems that require replacement lamps.

The average traffic signal system for an individual intersection consists of 5 signal heads, each containing 12" red, amber and green (at least one) incandescent lamps, 5 signal heads, each containing 8" red, amber and green incandescent lamps and 7 pedestrian signals, each containing "Walk" and "Don't Walk" incandescent lamps(see Appendix A). The traffic signal lamps are 135 watts, and 60 watts, while the pedestrian signals are 69 watt lamps. The entire system will consume approximately 1650 watts each hour of operation. The total annual incandescent traffic signal system power consumption is approximately 2.56 gW.h.

## 2.2. Recommendation

It is recommended that the Halifax Regional Municipality replace the traffic signal systems that utilize incandescent lamps with LED lamps. This will result in a 90% reduction to the municipality's traffic light system energy consumption. In addition, the maintenance turn-around for lamp replacement will increase from a 3 year cycle to an 8 to 10 year cycle. Greenhouse gas emissions can be expected to reduce by 2575 tonnes annually.

Even though the new technology provides a significant reduction to the cost of operation, an acceptable simple payback of 4 years cannot be achieved. Lamp replacement is anticipated to cost the HRM approximately $1,400,000.00. Based on first year energy savings, HRM could expect to achieve a simple payback of about 6.3 years. An incentive of $526,000.00 from NSPI will be needed to reduce the simple payback to four years.

## 2.3. Savings and Cost Estimates

| | |
|---|---|
| Electricity cost Savings: | $63,000 per year |
| Operating Cost Savings | $160,900 per year |

Electricity savings are based on nominal lamp wattage of the various incandescent and LED lamps. The number of lamps is based on a survey of 169 intersections (Appendix A). Typical intersections were used to calculate daily power consumption for both the incandescent and LED technologies (Appendix A). The number of lamps is reduced when a switch is made to LED lamps due to the different configuration with the pedestrian signs. Operating cost savings are based on the operating cost associated with the 3 year life of the incandescent lamp and associated replacement cost(Appendix A). The cost for installing LED replacement lamps is based on a tender for changing over 46 systems, and includes allowance for traffic control to complete the work. In addition, it is assumed that, for the economic evaluation, an LED lamp would have a 9 year life span. As a result, the evaluation is based on a 9 year cost of operation.

The LED lamp purchase cost has been adjusted to reflect the NS Department of Energy funding to assist with the purchase of 6856 LED traffic and pedestrian signals. These funds were provided over a three year period commencing in 2005. To date, about 25% of the lamps have been installed. This evaluation considers only the

incremental cost associated with the remaining lamps that have to be purchased in order to fully convert all intersections to LED technology.

## 3 Measurement and Verification (M&V) Plan

Performance of the LED signal systems will be verified by measuring actual energy consumption of each converted intersection over a 24 hour operating period. This is consistent with the methodology for adjusting the Unmetered Rate Class to reflect replacement LED lamps. The annual energy use of the new LED signal systems assumes continuous operation of at least one lamp in each signal head over each hour of the year.

HRM will provide NSPI with an M&V Report that includes a copy of the testing report for this installation. The report will identify the test equipment, measurement points and dates. The M&V Report will also include a brief analysis to confirm actual savings based on a base energy measurement of each of the existing intersections, and updated measurement of the converted intersection.

The cost for these measurements is included in the installation costs quoted above. No equipment will be required from NSPI to complete these measurements.

## 4 Implementation Schedule

Installation is scheduled to start on March 01, 2009 with completion by August 01. The M&V Report will be submitted by August 31, 2009.

## 5 Financing

No financing is being requested for this project.

# Correspondence

This email correspondence with Angus Doyle outlines the budget requirements of Halifax Regional Municipality.

Date: 1-29-10

-----Original Message-----
From: Angus Doyle [mailto:doylean@halifax.ca]
Sent: Friday, January 29, 2010 3:37 PM
To: JAMES CORNING
Cc: Taso Koutroulakis ; FAULKNER, CHUCK
Subject: RE: Traffic Signals project update

Hi James;

Sorry for the slow response. I was quite busy with a number of other issues.

As with most organizations, HRM is only able to work with budgeted amounts for such projects. We were able to allocate a maximum of about $780,000. to this project. With the anticipated contribution from NSPI, I indicated that a 4 year simple payback was "acceptable". However it was acceptable because we were able to move the project forward with out available funds and your help. In the meantime, HRM has spent about $325,000 of that budget on traffic signal systems,on our own, largely because we committed to installing the lamps which had been purchased through incentive funds from Conserve NS. Because the budget had not been increased, we are now working with approximately $455,865. Working back from that number, we would still need the $380k to complete our project. This translates to about a 2.5 year acceptable simple payback.

If we get the $240,000 to $250,000, as previously indicated, we will have to redirect about $140,000 from our operating budget to complete this project. I have approval for that amount. I would hope that we don't have to find an additional $80,000 due to an identified acceptable payback. Let me know if you need any additional documentation. Thanks for you help.

Angus

>>> "CORNING, JAMES" <Dave.Corning@nspower.ca> 1/25/2010 2:03:39 pm >>>
Angus,

I realize that the offer I sent to you was $244,057.

Unfortunately this corresponds to a simple payback of 3.5 years.

As you require a 4 year payback, as referenced in your feasibility study, the incentive should reflect this.

As such, the maximum incentive we can offer is $160,685.

I will give you a call to discuss this.

David Corning
Engineering Co-op Student
Commercial & Industrial Custom Program
Nova Scotia Power Inc.
---
Phone: (902) 428-6219
Fax: (902) 428-6066
E-Mail: dave.corning@nspower.ca

# Appendix A:

# Feasibility Study Data Sheet

| | |
|---|---|
| Project: | Halifax Regional Municipality - LED Traffic Light Retrofit |
| Measure: | LED Traffic Light |
| Prepared By: | David Corning |
| Date: | February 1, 2010 |

## Project Information

| | | |
|---|---|---|
| NSPI Account Number | Various | |
| Demand Cost | $0.00 | per kVA or kW, per month (Note: No demand charge applied in this project) |
| Energy Cost | $0.0795 | per kWh, per month (Based on average unit cost) |

### Savings Summary

| Month | Electrical Energy Saved (kWh) | Reduction in Metered Peak Electrical Demand (kW or kVA) | Electricity Cost Savings: Energy ($) | Demand ($) | Total ($) |
|---|---|---|---|---|---|
| January | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| February | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| March | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| April | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| May | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| June | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| July | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| August | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| September | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| October | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| November | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| December | 135,587 | 186.0 | $10,777.92 | $0.00 | $10,777.92 |
| **Annual Totals** | 1,627,047 | | **$129,335.00** | **$0.00** | **$129,335.00** |

## Project Cost & Benefits Summary

| | | |
|---|---|---|
| Estimated Measure Life | 15 | years |
| Total Installed Measure Cost - Energy Efficient Case | $826,021 | |
| Total Installed Measure Cost - Base Case | $0 | |
| Total Incentives and Rebates from non-NSPI Sources | $0 | |
| Total Eligible Incremental Costs | $826,021 | (not including NSPI incentives) |
| Electricity Benefits | $129,335 | per year |
| Non-Electricity Benefits (such as fossil fuel, wood, water savings, O&M, etc.) | $37,000 | per year |
| Total Benefits | $166,335 | per year |
| Incentive Requested from NSPI | $244,057 | This entry is optional. Incentive amounts (if any) will be determined by NSPI |

## Project Economics Summary

| | |
|---|---|
| **Without an Incentive from NSPI** | |
| Simple Payback of Incremental Costs (Based on Electricity Benefits) | 6.39 years |
| Simple Payback of Incremental Costs (Based on Total Benefits) | 4.97 years |
| **With the Requested Incentive Amount from NSPI** | |
| Simple Payback of Incremental Costs (Based on Electricity Benefits) | 4.50 years |
| Simple Payback of Incremental Costs (Based on Total Benefits) | 3.50 years |

# Appendix B:

# Energy Savings Calculations and Cost Estimates

| Halifax Regional Municipality ECONOMIC EVALUATION - LED Traffic Signal Conversion Project |
|---|

## Cost Analysis

| 2008 | Rate Code | Wattage | Cost/Month | | Rate Code | Wattage | Cost/Month |
|---|---|---|---|---|---|---|---|
| INCANDESCENT SYSTEM | 501 | 69 W | $ 1.43 | LED SYSTEM | 530 | Non-Continuous | $ 0.27 |
| | 508 | 60 W | $ 1.25 | | 531 | Continuous | $ 0.44 |
| | 509 | 135 W | $ 2.76 | | | | |

| 2009 | Rate Code | Wattage | Cost/Month | | Rate Code | Wattage | Cost/Month |
|---|---|---|---|---|---|---|---|
| INCANDESCENT SYSTEM | 501 | 69 W | $ 1.45 | LED SYSTEM | 530 | Non-Continuous | $ 0.27 |
| | 508 | 60 W | $ 1.26 | | 531 | Continuous | $ 0.44 |
| | 509 | 135 W | $ 2.79 | | | | |

| Rate Increse | Rate Code | Variance | | Rate Code | Variance |
|---|---|---|---|---|---|
| INCANDESCENT SYSTEM | 501 | 1.38% | LED SYSTEM | 530 | 0.00% |
| | 508 | 0.79% | | 531 | 0.00% |
| | 509 | 1.08% | | | |
| | Average | 1.08% | | Average | 0.00% |

| | |
|---|---|
| Number of Intersections (lamp ready) | 30 |
| The Rest | 79 |
| Total Number of Intersections | 109 |

| INCANDESCENT SYSTEM / Intersection | $/unit | $/Intersection | Notes |
|---|---|---|---|
| Lamp Cost | $ 6.04 | $ 332.20 | 1. Cost for Incandescent Lamp is based on latest purchase requisitions |
| Cost to Install Head (3) | $ 142.62 | $ 2,852.40 | 2. Cost to install incandescent lamps is based on latest operating cost information |
| Total | $ 148.66 | $ 3,184.60 | |

| | |
|---|---|
| **Maintenance Cost / year** | $ 115,707.13 |

| LED SYSTEM / Intersection | Number of Lights | $/lamp | Total $ | Notes |
|---|---|---|---|---|
| Ped Walk | 8 | $ 101.00 | $ 808.00 | |
| Ped Don't Walk | 0 | $ - | $ - | |
| 12" Red | 12 | $ 51.00 | $ 612.00 | |
| 12" Amber | 4 | $ 59.80 | $ 239.20 | |
| 12" Green | 4 | $ 80.28 | $ 321.12 | 1. Intersection conversion is based on most up to date historical data |
| 8" Amber | 8 | $ 49.00 | $ 392.00 | 2. Lamp prices are based on latest quoted pricing (Appendix B) |
| 8" Green | 8 | $ 69.00 | $ 552.00 | |
| Total | 44 | | $ 2,924.32 | |
| Other Cost (Installation, etc.) | | | $ 5,000.00 | |
| Total Cost | | | $ 7,924.32 | |

| | |
|---|---|
| **Capital Cost** | $ 776,021.28 |
| **Maintenance Cost / year** | $ 78,707.81 |
| **Maintenance Savings / year** | $96,999.32 |

| Engineering Costs | Notes |
|---|---|

| | | | |
|---|---|---|---|
| Feasability Study | $ | 4,000 | 1 This estimate is based on 3 days engineering time |
| Verification/Measurement | $ | 43,600 | 2 Verification and measurement costs are based on 4 hours/intersection for recording both incandescent and LED energy consumption |
| Verification/Measurement Report | $ | 2,400 | |
| Total | $ | 50,000 | |

## Energy Savings and Demand Savings

| INCANDESCENT SYSTEM | Signal Heads | Lamps | | Wattage/lamp | Total Wattage | Cost/Month |
|---|---|---|---|---|---|---|
| | 8 | 8 | Ped Walk | 69 | 552 | $ 11.60 |
| | | 8 | Ped Don't Walk | 69 | | $ 11.60 |
| | 8 | 8 | 12" Red | 135 | 1080 | $ 22.32 |
| | | 8 | 12" Amber | 135 | | $ 22.32 |
| | | 10 | 12" Green | 135 | | $ 27.90 |
| | 4 | 4 | 8" Red | 60 | 240 | $ 5.04 |
| | | 4 | 8" Amber | 60 | | $ 5.04 |
| | | 5 | 8"Green | 60 | | $ 6.30 |
| Total | 20 | 55 | | | | $ 112.12 |

| | | |
|---|---|---|
| Hourly Usage | 1,872 | Watts |
| Annual Usage | 16,398,720 | Wh |
| | 16,399 | kWh |
| Annual Charge | | $ 1,345.44 |

| LED SYSTEM | Signal Heads | Lamps | | Wattage/lamp | Total Wattage | |
|---|---|---|---|---|---|---|
| | 8 | 8 | Bi Modal Ped Head | 5 | 40 | $ 3.52 |
| | 4 | 4 | 12" Red | 10 | 58.7 | $ 1.08 |
| | | 4 | 12" Amber | 22 | | $ 1.08 |
| | | 4 | 12" Green | 12 | | $ 1.08 |
| | 8 | 8 | 12" Red | 10 | 69.3 | $ 2.16 |
| | | 8 | 8" Amber | 8 | | $ 2.16 |
| | | 8 | 8" Green | 8 | | $ 2.16 |
| | | | Avg LED Signal Head - 12" | 14.67 | | |
| Total | 20 | 44 | 8" | 8.67 | | $ 13.24 |

| | | |
|---|---|---|
| Hourly Usage | 168 | Watts |
| Annual Usage | 1,471,680 | Wh |
| | 1,472 | kWh |
| Annual Charge | | $ 158.88 |

| | | |
|---|---|---|
| **Energy Savings / Intersection** | **14,927** | **kWh** |
| **Peak Electrical Demand Savings / Intersection** | **2** | **kW** |
| **Total Energy Savings** | **1,627,047** | **kWh** |
| **Total Demand Savings** | **186** | **kW** |

## Project Economic Evaluation

| INCANDESCENT SYSTEM | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|
| Energy Charge | $ 146,652.96 | $ 148,236.81 | $ 149,837.77 | $ 151,456.02 | $ 153,091.74 | $ 154,745.13 | $ 156,416.38 | $ 158,105.68 | $ 159,813.22 |
| Maintenance $ | $ 115,707.13 | $ 119,178.35 | $ 122,753.70 | $ 126,436.31 | $ 130,229.40 | $ 134,136.28 | $ 138,160.37 | $ 142,305.18 | $ 146,574.33 |
| Total | $ 262,360.09 | $ 267,415.16 | $ 272,591.47 | $ 277,892.33 | $ 283,321.14 | $ 288,881.41 | $ 294,576.75 | $ 300,410.86 | $ 306,387.55 |
| NPV | $2,099,187.74 | | | | | | | | |

| LED SYSTEM | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Energy Charge | | | | | | | | | |
| Maintenance $ | $ 17,317.92 | $ 17,504.95 | $ 17,694.01 | $ 17,885.10 | $ 18,078.26 | $ 18,273.51 | $ 18,470.86 | $ 18,670.35 | $ 18,871.99 |
| Capital | $ 78,707.81 | $ 81,069.04 | $ 83,501.12 | $ 86,006.15 | $ 88,586.33 | $ 91,243.92 | $ 93,981.24 | $ 96,800.68 | $ 99,704.70 |
| Engineering | $ 776,021.28 | | | | | | | | |
| | $ 50,000.00 | | | | | | | | |
| Total | $ 922,047.01 | $ 17,504.95 | $ 17,694.01 | $ 17,885.10 | $ 18,078.26 | $ 18,273.51 | $ 18,470.86 | $ 18,670.35 | $ 18,871.99 |
| NPV | $1,004,024.76 | | | | | | | | |

| | |
|---|---|
| Maintenance Savings | $ 36,999.32 |
| Energy Savings | $ 129,335.04 |
| Total Savings | $ 166,334.36 |

Simple Payback 4.97