MARITIME ELECTRIC
A FORTIS COMPANY

August 31, 2010

Mr. Mark Lanigan
Island Regulatory and Appeals Commission
PO Box 577
134 Kent Street, Suite 501
Charlottetown PE C1A 7L1

Dear Mr. Lanigan:

Demand Side Management and Energy Conservation Plan for Years 2011 - 2015

Please find attached eight (8) copies of Maritime Electric's Demand Side Management and Energy Conservation Plan for Years 2011 - 2015. A PDF version of the Plan will be forwarded later today.

If you have any questions, please do not hesitate to contact me at 629-3667.

Yours truly,

MARITIME ELECTRIC

S. D. Loggie
Vice President, Customer Service

SDL19
Enclosure

Demand Side Management and Energy Conservation

Plan for Years 2011-2015

August 31, 2010

MARITIME ELECTRIC
A FORTIS COMPANY

TABLE OF CONTENTS

APPENDICES

1. EXECUTIVE SUMMARY

This document provides an outline of Maritime Electric Company, Limited's ("Maritime Electric" or the "Company") proposed Demand Side Management ("DSM") and Energy Conservation Plan ("the Plan") for the years 2011 to 2015.

The Renewable Energy Act (the "Act") requires that every public utility on PEI file with the Island Regulatory and Appeals Commission ("IRAC" or "the Commission"), before September 1, 2010, a plan of the DSM initiatives that the public utility proposes to undertake during the period 2011 to 2015 to ensure that the intensity of peak demand for the calendar year 2015 is likely to be at least 10% less than the level for the calendar year 2004.

The Act requires the 10% reduction to be implemented in two stages. The first stage is a 5% reduction by the calendar year 2010 through DSM measures undertaken, up to and including, the year 2010. The DSM measures proposed for 2011 to 2015 are intended to result in a second 5% reduction by 2015, so that the intensity of peak demand for 2015 will be at least 10% less than for the calendar year 2004.

A 5% reduction in intensity of peak demand at the end of 2010, relative to 2004, corresponds to Maritime Electric's peak load being 9 MW less than what it otherwise would be if the intensity of peak demand remained unchanged at the 2004 level. The DSM measures proposed for 2011 to 2015 are intended to reduce the peak load by an additional 9 MW while sustaining the 9 MW reduction expected to be achieved by the year 2010.

The Company's proposed Plan is based on the following observations and conclusions:

- The peak load is driven by lighting which represents the most logical area to focus on for programs intended to reduce the peak load;
- Post December 2010 there will be 10 MW of incandescent holiday lighting load remaining at time of peak;

- White light emitting diode (LED) technology is improving much faster than expected such that it is now cost effective to promote its use;

- It is not cost effective to replace equipment/appliances before the end of their service life. Incentive programs should focus on new installations and end of life replacements; and

- Results of benefit cost analyses of potential programs.

The Company has completed benefit cost tests on the following programs and the results are shown in Table 1.

Table 1
Benefit Cost Ratios for
Potential Incentive Rebate Programs

Potential Rebate Program	Appendix Schedule	Participant Test	Utility Test	Rate Impact Test	Total Resource Test	Societal Cost Test
BR30 CFL Flood Light	3.3	2.69	6.63	0.75	2.11	2.25
LED Holiday Lighting	3.2	1.40	2.62	1.44	1.74	1.78
Bare CFL	3.4	2.28	8.42	0.74	1.62	1.78
ENERGY STAR Dehumidifier	3.6	2.65	2.29	0.51	1.26	1.43
White LED Pot Light	3.5	1.60	4.08	0.70	1.23	1.32
ENERGY STAR Clothes Washer	3.7	1.54	1.12	0.45	0.85	0.93
ENERGY STAR Refrigerator	3.9	1.39	1.90	0.54	0.76	0.84
Refrigerator Roundup (second refrigerator)	3.8	2.57	1.11	0.43	0.72	0.80
T12 to T8 Lighting Conversion	3.10	1.44	1.52	0.50	0.72	0.80

The Total Resource Cost Test is generally relied upon in deciding on the cost effectiveness of a potential energy efficiency measure because it is viewed as providing a broader, more balanced perspective. For a potential program that has a benefit cost ratio for the Total Resource Cost Test greater than 1.0 that means that the benefits outweigh the costs of the potential program and it is recommended for implementation.

The proposed Plan consists of four rebate-based programs intended to incent consumers to convert to more energy efficient lighting products, two programs for commercial/industrial energy savings, as well as, ongoing community outreach activities. Table 2 lists the proposed programs, the reduction in peak load expected to be realized through each program, and the estimated implementation cost for each program.

Table 2
Summary of 2011-2015 Proposed DSM Programs

Proposed Program	Expected Peak Reduction (MW)	Estimated Cost ($)
LED Holiday Lighting Rebate	6.0	$1,248,000
BR30 CFL Flood Light Rebate	0.5	129,000
Bare CFL Rebate	2.6	415,000
White LED Pot Light Rebate	0.5	352,000
Community Outreach Activities	included in programs above	757,500
Commercial/Industrial Energy Audits	0.3	300,000
Total	**9.9**	**$3,201,500**

The estimated cost of $3,201,500 in Table 2 represents an average expenditure of $640,300 per year. This is somewhat higher than the Company's annual expenditures incurred in 2009 and forecast for 2010 for DSM and energy conservation programs designed to achieve the first 5% reduction in intensity of peak demand. The Company proposes to recover these costs through the Energy Cost Adjustment Mechanism as is currently being done.

The Commercial/Industrial Energy Audit Pilot Program conducted in 2009 appears to have been successful based on preliminary analysis and the Company sees merit in continuing with these audits. Management believes that an audit program for businesses is an effective way to assist non-residential customers in reducing electricity usage. The Company plans to co-fund energy audits with the Office of Energy Efficiency.

The specific details of the programs proposed in the Plan will be developed by Management, if the Commission approves of this Plan, and will be presented to the Commission as part of the Company's Status Report filing set for April 30, 2011.

2.0 INTRODUCTION

The Renewable Energy Act requires, among other things, that public utilities in PEI implement DSM measures designed to reduce the "intensity of peak demand" for electricity usage. Section 6.(3) of the Act reads as follows:

> *"Every public utility shall, before September 1, 2010, prepare and submit to the Commission for its approval a plan of the demand side management measures that the public utility proposes to undertake during the period beginning on January 1, 2011 and ending on December 31, 2015 to ensure that the reduction in the intensity of peak demand by rate payers for electric energy from the public utility by the end of that period exceeds or is equal to the percentage reduction required to obtain the approval of the Commission under subsection (4)."*

Subsection 6.(4) reads as follows:

> *"The Commission may, on receipt of a demand side management plan for the period referred to in subsection (1), approve the plan if the Commission is satisfied that, after the implementation of the measures set out in the plan, the intensity of the peak demand for electric energy from the public utility for the calendar year 2015 is likely to be at least 10% less than the intensity of the peak demand for electric energy from the public utility for the calendar year 2004."*

Sections 6.(1) and 6.(2) of the Act contain similar provisions that require public utilities to implement DSM plans during the period up to December 31, 2010 that are intended to achieve a 5% reduction in intensity of peak demand for the calendar year 2010. Based on the Demand Side Management and Energy Conservation Status Report filed with the Commission in April 2010, Maritime Electric expects that the 5% reduction in intensity of peak demand for 2010 relative to 2004 will be achieved. The DSM measures proposed for 2011 to 2015 are intended to provide a further 5% reduction in intensity of peak demand relative to 2004 so that when combined with the 5% reduction in intensity of peak demand that is expected to be achieved through the measures implemented up to, and including, 2010, the overall result is expected to be the required 10% reduction in intensity of peak demand for the calendar year 2015.

It has been established with the Commission that a 5% reduction in intensity of peak demand relative to 2004 corresponds to Maritime Electric's peak load being 9 MW less than what it otherwise would be if the intensity of peak demand remained unchanged at the 2004 level. In this report, DSM measures proposed for 2011 to 2015 are described in terms of their potential to reduce the peak load, with the overall objective of reducing the peak load by an additional 9 MW while sustaining the 9 MW reduction expected to be achieved up to and including 2010.

This document describes Maritime Electric's proposed strategy for DSM during the period 2011 to 2015. This strategy has been largely developed through answering the following five questions:

1. What is the size of the remaining incandescent holiday lighting load? (See Section 3.1.)
2. What is the status of LED technology development? (See Section 3.2.)
3. What is the potential for DSM programs in addition to LED holiday lighting? (See Section 3.3.)
4. What is the potential impact of future growth in electric space heating on system load factor? (See Section 3.4.)
5. Does street lighting represent a potential area for DSM activity? (See Section 3.5.)

Benefit cost analyses have been completed for a number of potential DSM programs (Section 4.0). For the programs that are being proposed, the expected reductions in peak load and estimated implementation costs are summarized in Table 6. The specific details of the programs will be developed by Management, if the Commission approves the Plan, and will be presented to the Commission as part of the Company's Status Report filing set for April 30, 2011.

3.0 PLAN ANALYSIS AND CONSIDERATIONS

3.1 Remaining Incandescent Holiday Lighting Load

The amount of holiday lighting load at the time of the 2009 Maritime Electric system peak has been estimated as 12.1 MW. The estimation process is described in Appendix 1.

Using a similar process in 2005, the amount of holiday lighting load at the time of the 2004 Maritime Electric system peak was estimated at 17.7 MW (see Section 3.0 of Company filing dated November 7, 2006 - Demand Side Management Phase II Report). This indicates an estimated 5.6 MW (17.7 MW minus 12.1 MW) reduction in peak load over this period as a result of conversions to LED holiday lighting.

Maritime Electric expects that there will be a further 2 MW reduction in incandescent holiday lighting load in 2010. This will leave approximately 10 MW (12.1 MW - 2.0 MW) of mostly incandescent holiday lighting load post December 2010. Since LED holiday lighting provides a 90% saving in electricity use compared to incandescent lighting, this represents potential for up to a further 9 MW reduction in peak load during the period 2011 to 2015. Maritime Electric believes that a large portion of the required second 9 MW reduction in peak load can be achieved through additional conversions to LED holiday lighting. Maritime Electric therefore proposes to continue with LED holiday lighting as a main focus of DSM activities for 2011 to 2015.

3.2 Status of LED Technology Development

Since Maritime Electric began promoting LED holiday lighting in 2004, the quality of light output has improved and the price has declined. In the Fall of 2008 the regular retail price for a string of 70 LED holiday lights was approximately $13.00. Continued improvements are expected during the next few years. A retail price of $10.00 for a string of 70 LED holiday lights has been assumed in the benefit cost analysis outlined in Section 4.

The development of white LED lighting for general illumination is making significant progress. There are now available a number of white LED lamps that are approximately equivalent in light output to a 60 watt incandescent and that retail for as low as $80. This suggests that it is feasible to begin including white LED lighting in the Company's DSM activities.

3.3 Potential for DSM Programs In Addition to LED Holiday Lighting

Maritime Electric considers that lighting represents the greatest potential for reducing the peak load through DSM measures. The following three factors support this conclusion:

- The PEI system peak load is still driven by lighting. The Maritime Electric peak consistently occurs during the hour ending 6:00 p.m. on a day during the middle two weeks of December. This is when the days are shortest and holiday lighting is on at the time of the system peak in addition to regular lighting in homes and businesses. The impact of the lighting load is shown graphically in Appendix 2. The chart in Appendix 2 (PEI Daily Load Shapes) shows hourly PEI electricity loads for the day of the 2009 system peak (December 17, a Thursday), as well as the hourly loads for a Thursday in mid-May 2009 (May 14). The upper line is the load for December 17, 2009, illustrating the substantial increase in load beginning in late afternoon, when the sun sets before 5:00 p.m. resulting in the annual system peak load occurring at this time.

- There is a relatively short service life with respect to incandescent lighting products – typically ranging from several months to several years. When this factor is combined with the development and introduction in recent years of more efficient lighting technologies (i.e. compact fluorescent (CFL) and LED) that can be substituted for incandescent lighting in many applications, the potential for energy savings is substantial. CFLs use 75% less electricity and LEDs use 90% less electricity, than incandescent lighting. This represents a significant DSM opportunity to encourage consumers to convert from incandescent lighting products to CFL and LED based products.

- The other main uses for electricity in PEI (appliances and motors), have relatively long service lives – typically in the order of 15 to 20 years. The relatively long service lives for appliances and motors in combination with the Federal Government's minimum efficiency standards, which have been made progressively more stringent over the years, results in the potential for further energy savings being limited. Most of the products currently being sold have already built into them most of the cost effective gains in efficiency (regulated products that are imported or shipped inter-provincially for sale or lease in Canada are required to comply with the minimum energy efficiency standards). The DSM opportunity involves encouraging consumers to purchase appliances that are more efficient than the minimum standards. This is the objective of the ENERGY STAR program. ENERGY STAR qualified products exceed Canada's minimum energy efficiency standards by certain specified levels.

To illustrate the limited DSM opportunity with respect to household appliances, Table 3 summarizes annual average electricity usage for the major household appliances for selected years of manufacture, starting with 1984. An examination of the table shows that significant improvements in efficiency have been achieved over the years, driven in part by the Federal Government's minimum efficiency standards. For example, a standard refrigerator purchased today will use 57% less electricity than one purchased in 1990: a saving of 590 kWh annually (1,044 kWh - 454 kWh) for the size range shown. This 590 kWh annual saving will happen automatically because of the minimum efficiency standards. However, the purchase of an ENERGY STAR qualified model will provide the consumer with only a relatively small additional energy savings of 67 kWh annually (454 kWh - 387 kWh).

Table 3 Average Annual Energy Consumption (in kWh/year) of New Major Appliances Based on the Year of Manufacture					
	1984	**1990**	**1997**	**2000**	**2008**
Refrigerators (16.5 – 18.4 cu. ft.)					
▪ Standard Top-Mounted	1,457	1,044	664	665	454
▪ ENERGY STAR Qualified	-	-	-	-	387
Freezers (Standard Chest)	813	658	342	337	334
Kitchen ranges (30 inch)					
▪ Self-Cleaning	790	727	759	746	524
▪ Non-Self-Cleaning	-	786	780	771	516
Dishwashers					
▪ Standard	1,213	1,026	649	637	343
▪ ENERGY STAR Qualified	-	-	-	-	339
Clothes Washers					
• Standard (Top-Loading)	1,243	1,218	930	923	387
▪ ENERGY STAR Qualified	-	-	-	274	290
Clothes Dryers (Standard)	1,214	1,103	887	910	916

Source: National Energy Use Database, Natural Resources Canada, as shown in the 2010 EnerGuide Appliance Directory. Data for 1984 obtained directly from Natural Resources Canada.

<u>Commercial/institutional/Industrial Energy Audits</u>

A potential program under consideration is the funding of energy audits for commercial/institutional/industrial customers. Maritime Electric retained I. B. Storey to conduct 16 energy audits in Fall 2009, and follow up is currently underway to assess the extent of implementation by customers of the recommended DSM measures. There is interest on the part of customers in this type of program (over 100 customers expressed interest in participating in the pilot program). The Company believes that continuing to make the audits available is an effective way to assist non-residential customers in reducing their electricity usage. The Office of Energy Efficiency currently offers a subsidy to commercial and interested customers to complete energy audits. Maritime Electric proposes to provide additional funding to help fund audit costs in the commercial/industrial sector. Maritime Electric will report on its evaluation of this potential program as part of the April 2011 Status Report.

Winter Challenge

Maritime Electric plans to run Winter Challenge again in the fourth quarter of 2010 but does not plan to run the Program as part of the 2011 - 2015 Plan. The rationale for this decision is based on i) Management's judgement that the Winter Challenge Program is not likely to continue to attract an increased level of customer participation beyond 2010 as customers who are interested in participating in this type of program have done so and have substantially achieved their potential energy savings and ii) that the Company can achieve the objective set out in the Renewable Energy Act for the 2011 - 2015 period based on the programs proposed in this Plan.

3.4 Impact of Future Growth in Electric Space Heating on Load Factor

During the past decade oil prices have risen significantly. This has resulted in an increased interest in residential electric heat, particularly during the period 2005 to 2007. A concern is that a significant increase in electric heat will lower the system load factor.

The phrase "intensity of peak demand" as found in the Renewable Energy Act has been interpreted as meaning load factor. Load factor is the ratio of the energy used during a given time period to the energy that would have been used had the rate of usage during every hour during the time period been the same as for the peak usage hour. The annual load factor currently for the Maritime Electric system is approximately 0.65.

A space heating load, on its own, has a relatively low load factor, typically in the order of 0.30. This is much lower than the 0.65 for the Maritime Electric system. However, the Maritime Electric system peak load is driven by lighting, not space heating, so it is the load factor for the space heating load at time of system peak, not the space heating load on the coldest day of the year, that should be used in assessing the impact of electric space heating on the system load factor.

The average temperature at time of system peak is - 6ºC. The calculation in Appendix 4 shows that the corresponding load factor for the space heating load at time of system peak is 0.54. The value of 0.54 is less than the annual load factor of 0.65 for the Maritime Electric system so increasing the amount of electric space heating load will result in a lowering of the annual system load factor, but not by nearly as much as would be expected based on the value of 0.30 for a stand-alone space heating load.

The conclusion drawn from the above discussion is that an increase in electric space heating will lower the annual system load factor. The potential impact in regard to Maritime Electric's DSM programs is that an increase in electric space heating load will negate some of the improvement (i.e. increase) in load factor that the DSM programs are intended to achieve, and thus there may be a need to make an adjustment for this in determining to what extent the DSM programs have been successful in reducing the intensity of peak demand (i.e. increasing the annual system load factor).

3.5 Potential for DSM with Street Lighting

Street lights are on at the time of Maritime Electric's system peak load. However, they offer little potential for reducing the peak load due to the following:

- The street lighting load on the Maritime Electric system is less than 2 MW;

- In 1985 Maritime Electric began to use high pressure sodium (HPS) street lights for all new installations. HPS lighting is significantly more efficient than mercury vapour (MV) lighting used previously. Today there are relatively few MV street lights still in service due to normal attrition during the past 25 years; and

- LED street lights have recently become available. The benefits they currently offer are better quality light output and reduced maintenance costs due to longer lamp life. However, they are currently only marginally more efficient that HPS lighting and considerably more expensive.

4.0 BENEFIT COST ANALYSES FOR POTENTIAL DSM PROGRAMS

The benefit cost analysis performed for potential DSM programs is based on the five cost effectiveness tests that were developed in California during the 1980's. These tests look at the cost effectiveness of energy efficiency programs from the perspectives of the participant, the utility, the non-participant, the utility's service area or region and society as a whole. These tests are briefly described below[1].

- The Participant Test looks at cost effectiveness from the perspective of a utility customer who participates in the energy efficiency program. This test takes into account the following benefits and costs to the participating customer:

    - Benefits – the reduction in electricity bills and the incentive rebate received from the utility.
    - Costs – the cost to implement the efficiency measure (does not take into account the incentive rebate) and the cost to replace the lost space heating.

- The Utility Test looks at cost effectiveness from the perspective of the utility that undertakes the energy efficiency program. This test takes into account the following benefits and costs to the utility:

    - Benefits – avoided capacity purchase costs and avoided energy supply costs.
    - Costs – the cost to develop and administer the energy efficiency program, and the cost of incentive rebates to customers.

- The Rate Impact Test looks at cost effectiveness from the perspective of a utility customer who does not participate in the energy efficiency program by examining the effect of the program on the utility's rates. This test takes into account the following benefits and costs to the utility:

[1] Maritime Electric has relied on the following document in applying the tests:

National Action Plan for Energy Efficiency (November 2008). Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policy-Makers. Energy and Environmental Economics, Inc. and Regulatory Assistance Project. <www.epa.gov/eeactionplan>

  - Benefits – avoided capacity purchase costs and avoided energy supply costs.
  - Costs – the cost to develop and administer the energy efficiency program, the cost of incentive rebates to customers and the reduction in revenue due to reduced energy sales.

- The Total Resource Cost Test looks at cost effectiveness from the perspective of the entire area or region that the utility serves. This test takes into account the following benefits and costs to the region as a whole:

  - Benefits – avoided capacity purchases by the utility and the avoided energy supply costs by the utility.
  - Costs – the utility's cost to develop and administer the energy efficiency program (not including the incentive rebates), the cost to customers to implement the energy efficiency measure and the cost to customers to replace the lost space heating.

- The Societal Cost Test looks at cost effectiveness from a broader perspective than the Total Resource Cost Test. In addition to all the benefits and costs included in the Total Resource Cost Test, the Societal Cost Test takes into account societal benefits such as avoided emissions to the environment that result from the implementation of the energy efficiency program.

Table 4 shows the application of the five tests to a potential appliance rebate program that would incent consumers to purchase an ENERGY STAR refrigerator instead of a lower cost but less energy efficient model (that just meets the minimum efficiency standards). The tests are based, in this example, on the level of program activity needed to achieve a 1 kW reduction in peak load. Except for the increase in price to purchase the ENERGY STAR refrigerator, the amount of the incentive rebate and the utility DSM program costs, all the benefits and costs are present value amounts estimated to accrue over the service life of the appliance. Specific assumptions and inputs used in the preparation of Table 4 are detailed in Appendix Schedule 3.9.

Table 4
Benefit Cost Analysis for Potential
ENERGY STAR Refrigerator Rebate Program
(for 1 kW of system peak load reduction)

	Participant Test	Utility Test	Rate Impact Test	Total Resource Test	Societal Cost Test
Benefits:					
▪ Utility avoided capacity purchase	$ -	$ 608	$ 608	$ 608	$ 608
▪ Utility avoided energy supply cost		3,419	3,419	3,419	3,419
▪ Reduction in participants bills	5,270	-	-	-	-
▪ Incentive rebate to participants	2,023	-	-	-	-
▪ Value of avoided CO_2 emissions	-	-	-	-	456
Total	**$ 7,294**	**$ 4,026**	**$ 4,026**	**$ 4,026**	**$ 4,482**
Costs:					
▪ Utility DSM program admin. costs	$ -	$ 100	$ 100	$ 100	$ 100
▪ Utility DSM program rebate costs	-	2,023	2,023	-	-
▪ Revenue reduction to utility	-	-	5,270	-	-
▪ Participants incremental price	3,035	-	-	3,035	3,035
▪ Cost to replace lost space heating	2,197	-	-	2,197	2,197
Total	**$ 5,232**	**$ 2,123**	**$ 7,394**	**$ 5,332**	**$ 5,332**
Net benefit (cost)	**$ 2,062**	**$ 1,903**	**$ (3,367)**	**$ (1,306)**	**$ (850)**
Benefit Cost ratio	**1.39**	**1.90**	**0.54**	**0.76**	**0.84**

The Total Resource Cost Test is generally relied upon in deciding on the cost effectiveness of a potential energy efficiency measure because it is viewed as providing a broader, more balanced perspective. Based on the analysis in Table 4, the benefit cost ratio for the Total Resource Cost Test is less than 1.0 (equal to 0.76) which means that the benefits do not outweigh the costs for the potential refrigerator rebate program, and thus it is not recommended for implementation.

A number of potential incentive rebate programs were evaluated through the benefit cost analyses in Appendix 3. The following conclusions have been drawn based on the results of these analyses:

- It is not cost effective to replace equipment/appliances before the end of their service life. Incentive programs relating to the replacement of equipment/appliances should focus on new installations and end of life replacements; and

- The Federal Government's minimum efficiency standards for appliances have reduced their energy usage to the point that in most cases the additional energy saving offered by ENERGY STAR models is not sufficient to make potential incentive rebate programs cost effective in PEI. A key factor in this determination is the cost to replace the lost space heating provided by the less efficient appliances given PEI's eight month heating season (this is further discussed in Appendix 3).

Table 5 summarizes the results of the benefit cost analyses for potential incentive programs in Appendix 3 and summarized in Appendix Schedule 3.12. The programs are listed in descending order of benefit cost ratio for the Total Resource Cost Test.

Table 5
Benefit Cost Ratios for
Potential Incentive Rebate Programs

Potential Rebate Program	Appendix Schedule	Participant Test	Utility Test	Rate Impact Test	Total Resource Test	Societal Cost Test
BR30 CFL Flood Light	3.3	2.69	6.63	0.75	2.11	2.25
LED Holiday Lighting	3.2	1.40	2.62	1.44	1.74	1.78
Bare CFL	3.4	2.28	8.42	0.74	1.62	1.78
ENERGY STAR Dehumidifier	3.6	2.65	2.29	0.51	1.26	1.43
White LED Pot Light	3.5	1.60	4.08	0.70	1.23	1.32
ENERGY STAR Clothes Washer	3.7	1.54	1.12	0.45	0.85	0.93
ENERGY STAR Refrigerator	3.9	1.39	1.90	0.54	0.76	0.84
Refrigerator Roundup (second refrigerator)	3.8	2.57	1.11	0.43	0.72	0.80
T12 to T8 Lighting Conversion	3.10	1.44	1.52	0.50	0.72	0.80

5.0 COMMUNITY OUTREACH ACTIVITIES

Working with the community through outreach programs is an ongoing part of the Company's energy conservation strategy. These programs are intended to enhance energy conservation and awareness to help customers better understand their energy use. These activities also provide opportunities to promote the Company's incentive rebate programs.

Community Partnerships and Programs ($60,000 per year)

Community partnerships, tradeshows, presentations and lighting exchanges will continue to be an integral component of the Company's plan. A series of presentations will occur annually to help key stakeholders to learn more about energy conservation and joint programs and promotions will be developed to assist these groups. Improving energy conservation awareness is an important means by which the Company interacts with customers and influences sustainable behavior.

Commercial Energy Program Partnership ($45,000 per year)

Together with the Atlantic Canada Opportunities Agency (ACOA) and the Provincial Office of Energy Efficiency (OEE), the Company proposes to conduct an Energy Awareness and Lighting Retrofit program for small and medium sized commercial businesses. The Program is estimated to cost $135,000 annually with each of the three partners contributing $45,000 annually.

Education Curriculum ($10,000 per year)

The Company plans to continue with the successful Grade 6 "Electrical Energy Consumption and Conservation" unit developed in 2007 and work with partner community groups to deliver the program to Island schools.

Customer Information Website Development and Tools ($9,000 per year)

Over the next five years further improvements will be made to the Company's customer information and website in order to continue to provide updated energy conservation information, tools and programs for customers.

Commercial and Institutional Business Information Tools ($7,500 per year)

The Company will launch a new website section to provide business customers with information to assist with managing their energy usage, employee discussion tools and worksheets for savings and best practices as learned through the Island Commercial/Institutional Energy Savings Program Audits.

Test Pilots, Programs Development, Research and Program Evaluation ($20,000 per year)

Maritime Electric will continue to track the sustainability of energy savings. The focus will also be to identify energy efficient products through market research and track customers savings to evaluate program test pilots, program development, implementation and enhanced program delivery.

The annual budget for the community outreach activities is $151,500. Over the five year period 2011 to 2015 this will total $757,500.

6.0 POWERSHIFT ATLANTIC LOAD CONTROL DEMONSTRATION PROJECT

Maritime Electric is participating with the other Maritime Provinces' electric utilities in a project aimed at demonstrating the control of customers' loads in near or real time to provide load following ancillary services required to integrate additional wind power into the electricity supply for the region. This technology has the potential for other uses, such as peak load reduction; however, Maritime Electric will not be relying on this demonstration Project to meet the required 2015 reduction in intensity of peak demand because the results from the Project will not be available until 2014.

The Project is estimated to cost $32 million and involves University of New Brunswick, Nova Scotia Power, NB Power, Saint John Energy, Federal and Provincial governments as well as Maritime Electric.

The Project is being 50% funded from Natural Resources Canada's Clean Energy Fund. Maritime Electric's contribution will be approximately $350,000 over fiscal years 2010/2011 to 2013/2014. The Company will file a separate application with the Commission for approval to recover these costs through the Energy Cost Adjustment Mechanism. Maritime Electric expects to have at least 50 customer sites in PEI participating in the Project.

7.0 CONCLUSIONS AND PROPOSED DSM PLAN

The Company's proposal for DSM programs outlined in Table 6 below is based on the following conclusions/observations:

- The peak load is driven by lighting, which represents the most logical area to focus on for programs intended to reduce the peak load;
- Post December 2010 there will still be 10 MW of incandescent holiday lighting at time of peak;
- White LED technology is improving much faster than had been expected, such that it is now cost effective to promote its use;
- It is not cost effective to replace equipment/appliances before the end of their service life. Incentive programs should focus on new installations and end of life replacements; and
- Results of benefit cost analyses of potential programs (summarized in Table 5).

The proposed Plan consists of four rebate-based programs intended to incent consumers to purchase/convert to more energy efficient lighting products, two programs for commercial/industrial energy savings along with ongoing community outreach activities. A summary of the proposed programs, expected peak load reduction and estimated costs over the five year period is shown in Table 6.

Table 6
Summary of 2011-2015 Proposed DSM Programs

Proposed Program	Expected Peak Reduction (MW)	Estimated Cost ($)
LED Holiday Lighting Rebate	6.0	$1,248,000
BR30 CFL Flood Light Rebate	0.5	129,000
Bare CFL Rebate	2.6	415,000
White LED Pot Light Rebate	0.5	352,000
Community Outreach Activities	Included in programs above	757,500
Commercial/Industrial Energy Audit	0.3	300,000
Total	**9.9**	**$3,201,500**

The above estimated cost of $3,201,500 represents an average expenditure of $640,300 per year. This is somewhat higher than the Company's annual expenditures incurred in 2009 and forecast for 2010 for DSM and energy conservation programs which are intended to achieve the first 5% reduction in intensity of peak demand. The Company proposes to recover these costs through the Energy Cost Adjustment Mechanism as is currently being done.

An incentive rebate program for ENERGY STAR dehumidifiers (which had a Total Resource Cost Test benefit cost ratio of greater than 1 - see Table 5) has not been included because a survey of local retailers found that they carry only ENERGY STAR units, and thus there is no need for the program. More stringent minimum efficiency standards for dehumidifiers will become effective on October 1, 2012. The Company will review the need for a Program at that time.

A pilot program of 16 Commercial/Industrial Energy Audits conducted by I. B. Storey was done in Fall 2009. Maritime Electric is currently assessing the extent of implementation by customers of the recommended DSM measures. There was interest on the part of customers in this type of program (over 100 customers expressed interest in participating in the pilot program) and the Company believes that continuing to make the audits available is an effective way to assist non-residential customers in reducing their electricity usage. The Company plans to co-fund energy audits with the Office of Energy Efficiency.

The specific details of the programs proposed in this Plan will be developed by Management, if the Commission approves this Plan, and will be presented to the Commission as part of the Company's Status Report filing set for April 30, 2011.

APPENDIX 1

ESTIMATE OF HOLIDAY LIGHTING LOAD

Appendix 1 – Estimate of Holiday Lighting Load

The observed pattern of holiday lighting usage in PEI is that holiday lighting is used mainly during the month of December. Holiday lights start appearing in appreciable numbers at the end of November, and most lights are taken down (or at least no longer turned on) after January 1st. This observation suggests that the difference between the system load for the hour ending 18:00 in mid-December and the system load for the hour ending 18:00 in late November and early January should be due to the holiday lighting load.

In order to use the above observation as a basis for estimating the holiday lighting load at the time of the system peak, two other factors need to be taken into account. The first factor is whether the same amount of general lighting is in use by 17:00 in late November and early January as in mid-December. This can be determined from sunset times. Using street lighting as a proxy for general lighting, we know that the street lights come on approximately 20 minutes after the sun sets. An examination of sunset times for PEI shows that by November 14 the sun is setting at 16:40, and the sun continues to set at or before 16:40 through until January 6. Thus we can conclude that the general lighting load for the hour ending 18:00 should be the same in late November and early January as in mid-December.

The second factor that needs to be taken into account is ambient temperature, because this determines the electricity demand for heating loads, either for resistance heating or for motors to operate oil-fired furnaces. Ambient temperature has been taken into account as shown in the attached Appendix Schedule 1.1.

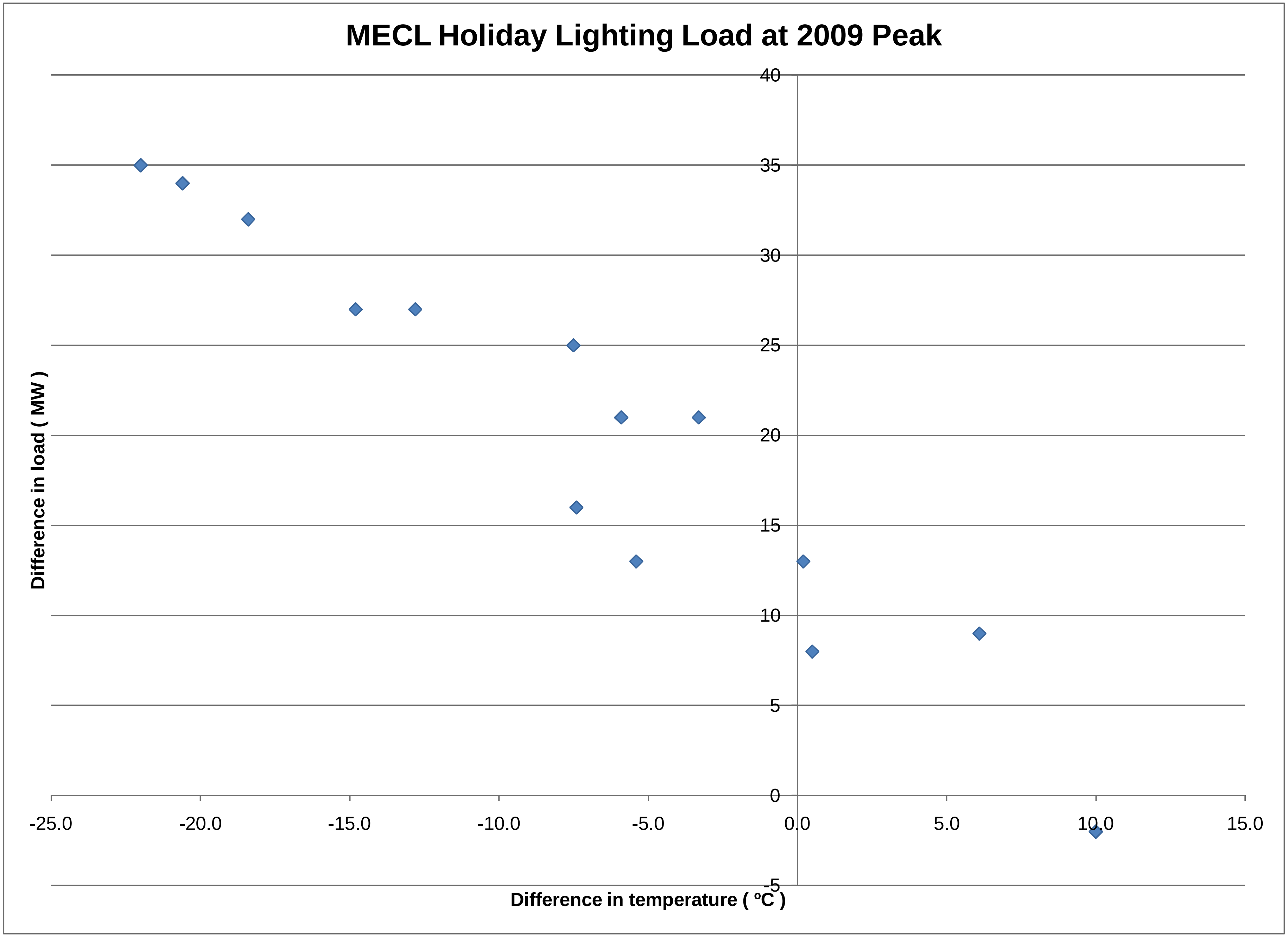
Appendix Schedule 1.1 shows the data used to estimate the holiday lighting load at the time of the system peak. For seven days in late November 2009, for seven days in mid December leading up to Christmas Day 2009, and for seven days in early January 2010 the Maritime Electric system load for the hour ending 18:00 and the temperature at the Charlottetown Airport at 17:00 are shown. The difference between the system load for the hour ending 18:00 for the Sunday in December and the Sundays in November and January has been calculated as well as the difference in ambient temperature at 17:00 between the Sunday in December and the Sundays in November and January. Similar calculations were done for each of the other days of the week. This gives 14 data pairs.

These data pairs are shown in graph form in Appendix Schedule 1.2. Here the difference in system load for the hour ending 18:00 has been plotted against the difference in temperature at 17:00. The formula for the least squares linear regression line is $y = 1.08x + 12.1$, where y is the difference in system load and x is the difference in ambient temperature. For a temperature difference of zero, there should be no difference in heating load, and all of the difference in system load is assumed to be due to holiday lighting. Since the y-intercept of the least squares regression line is 12.1, this means that the estimated load due to holiday lighting for the hour ending 18:00 is 12.1 MW.

Estimate of Maritime Electric Holiday Lighting Load for 2009

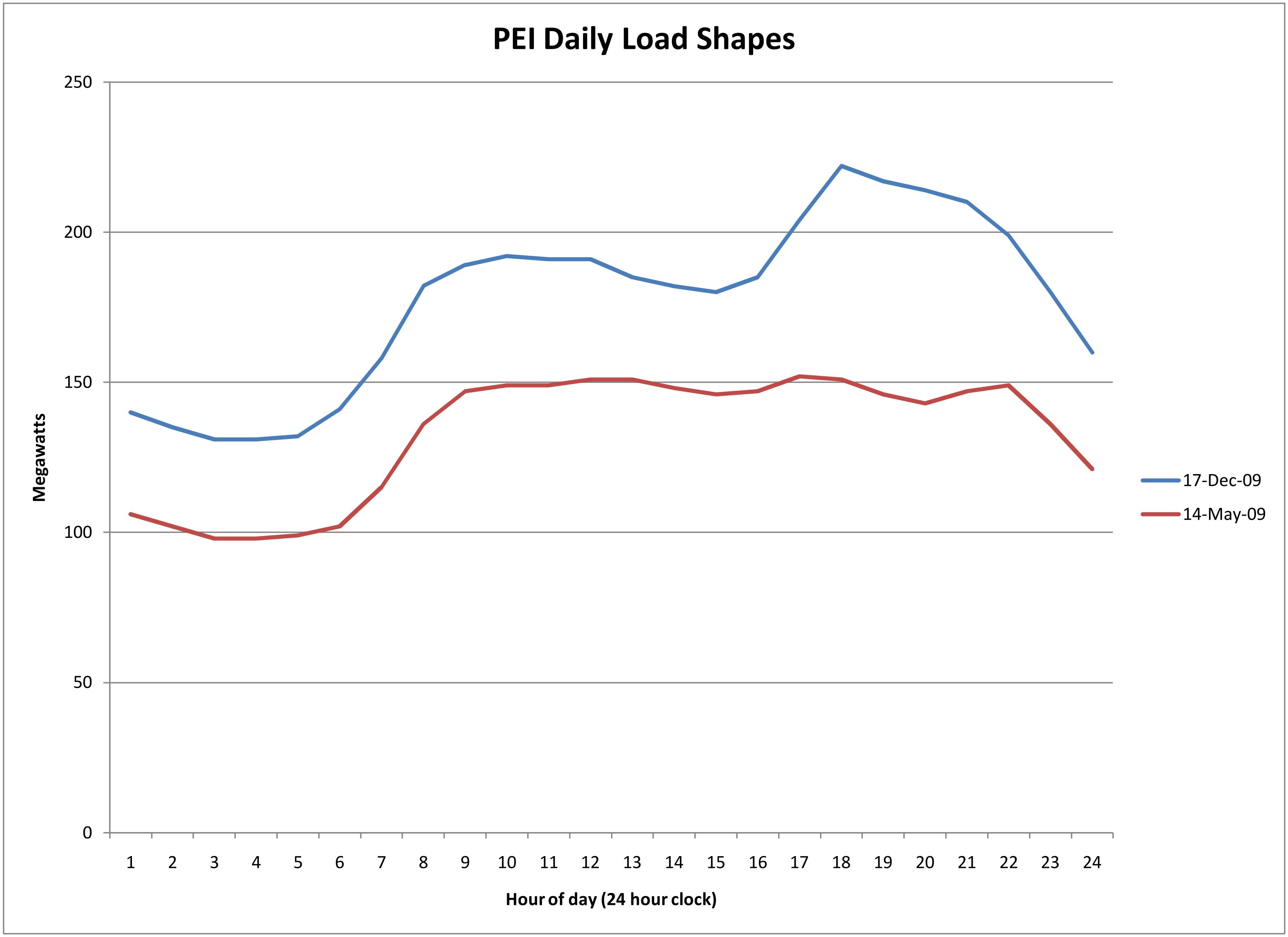
Year	Month	Date	Day of Week	Hour Ending	Total PEI Load (MWh/h)	Less City of S'Side (MWh/h)	Less Large Industrial (MWh/h)	M.E. Load Less Large Industrial (MWh/h)	December Load Difference (MWh/h)	Temp. at 17:00 (ºC)	December Temp. Difference (ºC)
2009	December	20	Sun	18:00	196	17	15	164		-1.3	
2009	December	21	Mon	18:00	204	21	17	166		1.6	
2009	December	15	Tue	18:00	204	20	17	167		1.3	
2009	December	16	Wed	18:00	217	22	17	178		-5.6	
2009	December	17	Thu	18:00	222	23	16	183		-13.0	
2009	December	18	Fri	18:00	216	22	17	177		-9.2	
2009	December	19	Sat	18:00	205	20	15	170		-9.9	
2009	November	22	Sun	18:00	166	17	6	143	21	2.0	-3.3
2009	November	23	Mon	18:00	180	19	8	153	13	1.4	0.2
2009	November	24	Tue	18:00	180	18	8	154	13	6.7	-5.4
2009	November	25	Wed	18:00	177	18	8	151	27	9.2	-14.8
2009	November	26	Thu	18:00	173	18	7	148	35	9.0	-22.0
2009	November	27	Fri	18:00	168	18	7	143	34	11.4	-20.6
2009	November	21	Sat	18:00	161	17	6	138	32	8.5	-18.4
2010	January	10	Sun	18:00	186	17	14	155	9	-7.4	6.1
2010	January	11	Mon	18:00	204	19	17	168	-2	-8.4	10.0
2010	January	5	Tue	18:00	194	19	16	159	8	0.8	0.5
2010	January	6	Wed	18:00	189	15	17	157	21	0.3	-5.9
2010	January	7	Thu	18:00	191	18	17	156	27	-0.2	-12.8
2010	January	8	Fri	18:00	188	19	17	152	25	-1.7	-7.5
2010	January	9	Sat	18:00	183	13	16	154	16	-2.5	-7.4

Linear regression results: (y = m * x + b)	m (slope)	-1.08	12.14	b (y intercept)
	std error (m)	0.10	1.15	std error (b)
	R2	0.91	3.40	std error (y)
	F	121.95	12.00	deg freedom
	SSreg	1413.80	139.12	SSresid


MECL Holiday Lighting Load at 2009 Peak
Difference in load (MW)
Difference in temperature (ºC)
40
35
30
25
20
15
10
5
0
-5
-25.0
-20.0
-15.0
-10.0
-5.0
0.0
5.0
10.0
15.0

APPENDIX 2

PEI DAILY LOAD SHAPES


PEI Daily Load Shapes
250
200
150
100
50
0
Megawatts
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Hour of day (24 hour clock)
17-Dec-09
14-May-09

APPENDIX 3

BENEFIT COST ANALYSIS

Appendix 3 – Benefit Cost Analysis

This Appendix contains Schedules for the following individual benefit cost analysis programs:

1. Summary of Main Input Assumptions for the Benefit Cost Analyses (Schedule 3.1)
2. LED holiday lighting incentive rebate program (Schedule 3.2)
3. CFL BR30 type reflector lamp incentive rebate program (Schedule 3.3)
4. Bare CFL incentive rebate program (Schedule 3.4)
5. White LED pot light incentive rebate program (Schedule 3.5)
6. Energy Star dehumidifier incentive rebate program (Schedule 3.6)
7. Energy Star clothes washer incentive rebate program (Schedule 3.7)
8. Refrigerator roundup program (Schedule 3.8)
9. Energy Star refrigerator incentive rebate program (Schedule 3.9)
10. T12 to T8 fluorescent lighting conversion program (Schedule 3.10)

This Appendix also contains the following summary spreadsheet Schedules:

1. Estimated technical potential of each program for peak load reduction (Schedule 3.11)
2. Overall summary of benefit cost analyses, including estimated program costs (Schedule 3.12)

Summary of Main Input Assumptions for the Benefit Cost Analyses

1. The following life expectancies for the major household appliances have been used. They are from the 2010 EnerGuide Appliance Directory.

Dishwashers	-	13 years	Electric ranges	-	16 years
Clothes washers	-	14 years	Refrigerators	-	18 years
Clothes dryers	-	16 years	Freezers	-	19 years

2. For simplicity, the utility's discount rate has been used in all the cost effectiveness tests. This is equal to Maritime Electric's weighted average cost of capital, which is 7.9%, based on 42.5% equity at 9.75% return and 57.5% long term debt at 6.5% interest rate.

   The utility discount rate is typically used for the Utility Test, the Rate Impact Test and the Total Resource Cost test. For the Participant Test the discount rate of an individual or business is typically used. This is equal to their cost of borrowing, and is usually higher than the utility discount rate. For the Societal Cost Test the social discount rate is typically used. This is usually lower than the utility discount rate.

3. Maritime Electric's average annual transmission and distribution system losses are 7.5%. This means that 100 kWh saved at the customer's premises will result in a 100 kWh/(1 - 0.075) = 108 kWh reduction in the amount of energy that the utility must generate or purchase. The present value of the utility's avoided energy supply cost is: (kWh saved by customer/(1 - 0.075)) x $/kWh x PV factor. (PV is present value.)

4. The estimated transmission and distribution system losses at the time of system peak are 15%. This means that 0.85 kW saved at the customer's premises at the time of system peak will result in a 0.85 kW/(1 - 0.15) = 1.0 kW reduction in system peak load. Also, Maritime Electric must maintain planning reserve capacity equal to 15% of firm peak load. Thus the present value of the utility's avoided capacity purchase is: (kW saved by customer/(1 - 0.15)) x 1.15 x $/kW-year x PV factor.

5. The table below shows that the heating season is eight months long in PEI - from October through May.

Monthly Normals for Charlottetown Airport		
	Heating degree days below 18ºC	**Cooling degree days above 18ºC**
January	805	0
February	730	0
March	655	0
April	460	0
May	277	1
June	114	11
July	30	44
August	35	39
September	138	5
October	315	0
November	471	0
December	685	0

For most household lighting and appliances, all of the electricity they use ends up as heat inside the house. This heat from electricity usage reduces the amount of fuel that would otherwise be needed for space heating. In PEI the main fuel used for space heating is furnace oil. Thus, if a more efficient refrigerator replaces a less efficient one, during the heating season additional furnace oil will need to be burned to make up for the reduced heat from the new refrigerator due to its lower electricity usage as compared to the old one.

6. A CO_2 emissions rate of 0.60 kg/kWh has been assumed, based on natural gas fired combined cycle generation. Maritime Electric's marginal source of energy supply is normally purchases from the mainland, which typically are priced based on natural gas fired generation. The Company's on-Island oil fired generating units normally run for only a few hours each year.

Benefit Cost Analysis for LED Holiday Lighting Rebate
(for 1.0 kW of System Peak Load Reduction)

10-08-26

		Participant test	Utility test	Rate impact test	Total resource cost test	Societal cost test
Benefits:	- Utility avoided capacity purchase	$ -	$ 434	$ 434	$ 434	$ 434
	- Utility avoided energy supply cost		111	111	111	111
	- Reduction in participants' bills	172				
	- avoided cost of incandescant mini-lites	98			98	98
	- Incentive rebate to participants	108				
	- Value of avoided CO2 emissions					15
	Total	$ 378	$ 546	$ 546	$ 644	$ 659
Costs:	- Utility DSM program admin. costs	$ -	100	100	100	100
	- Utility DSM program rebate costs		108	108		
	- Revenue reduction to utility			172		
	- Participants incremental capital cost	216			216	216
	- Cost to replace lost space heating	54			54	54
	Total	$ 270	$ 208	$ 380	$ 370	$ 370
	Net benefit (cost)	$ 109	$ 338	$ 166	$ 274	$ 289
	Benefit / cost ratio	1.40	2.62	1.44	1.74	1.78

Inputs and Assumptions

Assumed equipment life	years	10	
Present value factor for 10 years at 7.9 % discount rate is		6.7	
Average annual Transmission & Distribution losses	%	7.5	
Estimated T & D losses at system peak	%	15	
Utility avoided capacity purchase:			
- participant load reduction at time of system peak	kW	0.85	
- price of purchased capacity	$ / kW - year	56	
- present value is	$	434	
Utility avoided energy supply cost:			
- annual energy saving by participants	kWh	170	
- price of purchased energy	$ / kWh	0.09	
- present value is	$	111	
Reduction in participant's bills:			
- retail energy charge for electricity	$ / kWh	0.15	
- present value is	$	172	
Rebate to participants:			
- higher price for LED 70 light string ($ 10.00 - $ 4.00)	$	6.00	
- portion rebated to participants	%	50	
- participants rebate	$	3.00	
Cost to replace lost space heating:			
- furnace oil equivalent of annual energy savings	litres	21	(1 litre = 8 kWh)
- portion of energy savings that provided space heating	%	50	(50 % of lights outdoors)
- assumed furnace oil price	$ / litre	0.75	
- present value of cost for additional furnace oil	$	54	
Benefit of avoided CO2 emissions:			
- assumed CO2 emissions rate	kg / kWh	0.60	
- assumed price of CO2 emissions	$ / tonne	20	
- present value is	$	15	

Annual saving with LED for 70 light string is	4.725	kWh	((35 W - 3.5 W) x 150 h)
Reduction in load for one 70 light string is	0.032	kW	(35 W - 3.5 W)
Assume average reduction at system peak is	0.024	kW	(75 % on at time of system peak)
For 0.85 kW of custmr load reduction at peak,	36.0	units are required	

Benefit Cost Analysis for BR30 CFL Flood Light Rebate
(For 1.0 kW of System Peak Load Reduction)

10-08-26

		Participant test	Utility test	Rate impact test	Total resource cost test	Societal cost test
Benefits:	- Utility avoided capacity purchase	$ -	$ 417	$ 417	$ 417	$ 417
	- Utility avoided energy supply cost		1,378	1,378	1,378	1,378
	- Reduction in participants' bills	2,125				
	- avoided cost of BR30 incandescant lamps	1,012			1,012	1,012
	- Incentive rebate to participants	171				
	- Value of avoided CO2 emissions					184
	Total	$ 3,307	$ 1,795	$ 1,795	$ 2,807	$ 2,990
Costs:	- Utility DSM program admin. costs	$ -	100	100	100	100
	- Utility DSM program rebate costs		171	171		
	- Revenue reduction to utility			2,125		
	- Participants incremental capital cost	342			342	342
	- Cost to replace lost space heating	886			886	886
	Total	$ 1,227	$ 271	$ 2,396	$ 1,327	$ 1,327
	Net benefit (cost)	$ 2,080	$ 1,524	$ (601)	$ 1,479	$ 1,663
	Benefit / cost ratio	2.69	6.63	0.75	2.11	2.25

Inputs and Assumptions

Equipment life (8,000 hours rated life)	years	9.4	
Present value factor for 9.4 years at 7.9 % discount rate is		6.5	
Average annual Transmission & Distribution losses	%	7.5	
Estimated T & D losses at system peak	%	15	
Utility avoided capacity purchase:			
- participant load reduction at time of system peak	kW	0.85	
- price of purchased capacity	$ / kW - year	56	
- present value is	$	417	
Utility avoided energy supply cost:			
- annual energy saving by participants	kWh	2,189	
- price of purchased energy	$ / kWh	0.09	
- present value is	$	1,378	
Reduction in participant's bills:			
- retail energy charge for electricity	$ / kWh	0.15	
- present value is	$	2,125	
Rebate to participants:			
- higher price for BR30 CFL ($ 10.00 - $ 3.50)	$	6.50	
- portion rebated to participants	%	50	
- participants rebate	$	3.25	
Cost to replace lost space heating:			
- furnace oil equivalent of annual energy savings	litres	274	(1 litre = 8 kWh)
- portion of energy savings that provided space heating	%	66.7	(8 month htg season)
- assumed furnace oil price	$ / litre	0.75	
- present value of cost for additional furnace oil	$	886	
Benefit of avoided CO2 emissions:			
- assumed CO2 emissions rate	kg / kWh	0.60	
- assumed price of CO2 emissions	$ / tonne	20	
- present value is	$	184	

Annual saving with BR30 CFL is	41.65	kWh ((65 W - 16 W) x 850 h)
Reduction in customer load for one unit is	0.049	kW (65 W - 16 W)
Assume average reduction at system peak is	0.016	kW (33 % on at time of system peak)
For 0.85 kW of customer reduction at peak,	52.6	units are required

Benefit Cost Analysis for Bare CFL Rebate
(For 1.0 kW of System Peak Load Reduction)

10-08-26

		Participant test	Utility test	Rate impact test	Total resource cost test	Societal cost test
Benefits:	- Utility avoided capacity purchase	$ -	$ 272	$ 272	$ 272	$ 272
	- Utility avoided energy supply cost		1,047	1,047	1,047	1,047
	- Reduction in participants' bills	1,614				
	- avoided cost of standard incandescant lamp	120			120	120
	- Incentive rebate to participants	57				
	- Value of avoided CO2 emissions					140
	Total	$ 1,790	$ 1,319	$ 1,319	$ 1,438	$ 1,578
Costs:	- Utility DSM program admin. costs	$ -	100	100	100	100
	- Utility DSM program rebate costs		57	57		
	- Revenue reduction to utility			1,614		
	- Participants incremental capital cost	113			113	113
	- Cost to replace lost space heating	673			673	673
	Total	$ 786	$ 157	$ 1,771	$ 886	$ 886
	Net benefit (cost)	$ 1,004	$ 1,162	$ (452)	$ 552	$ 692
	Benefit / cost ratio	2.28	8.42	0.74	1.62	1.78

Inputs and Assumptions

Equipment life (8,000 hours rated life)	years	5.3	
Present value factor for 5.3 years at 7.9 % discount rate is		4.2	
Average annual Transmission & Distribution losses	%	7.5	
Estimated T & D losses at system peak	%	15	
Utility avoided capacity purchase:			
- participant load reduction at time of system peak	kW	0.85	
- price of purchased capacity	$ / kW - year	56	
- present value is	$	272	
Utility avoided energy supply cost:			
- annual energy saving by participants	kWh	2,550	
- price of purchased energy	$ / kWh	0.09	
- present value is	$	1,047	
Reduction in participant's bills:			
- retail energy charge for electricity	$ / kWh	0.15	
- present value is	$	1,614	
Rebate to participants:			
- higher price for bare CFL ($ 3.50 - $ 0.50)	$	3.00	
- portion rebated to participants	%	50	
- participants rebate	$	1.50	
Cost to replace lost space heating:			
- furnace oil equivalent of annual energy savings	litres	319	(1 litre = 8 kWh)
- portion of energy savings that provided space heating	%	66.7	(8 month htg season)
- assumed furnace oil price	$ / litre	0.75	
- present value of cost for additional furnace oil	$	673	
Benefit of avoided CO2 emissions:			
- assumed CO2 emissions rate	kg / kWh	0.60	
- assumed price of CO2 emissions	$ / tonne	20	
- present value is	$	140	

Annual saving with bare CFL is	67.5	kWh ((60 W - 15 W) x 1,500 h)
Reduction in customer load for one unit is	0.045	kW (60 W - 15 W)
Assume average reduction at system peak is	0.023	kW (50 % on at time of system peak)
For 0.85 kW of customer reduction at peak,	37.8	units are required

Benefit Cost Analysis for White LED Pot Light Rebate
(For 1.0 kW of System Peak Load Reduction)

10-08-26

		Participant test	Utility test	Rate impact test	Total resource cost test	Societal cost test
Benefits:	- Utility avoided capacity purchase	$ -	$ 637	$ 637	$ 637	$ 637
	- Utility avoided energy supply cost		2,107	2,107	2,107	2,107
	- Reduction in participants' bills	3,249				
	- avoided cost of BR30 incandescant lamps	1,404			1,404	1,404
	- Incentive rebate to participants	572				
	- Value of avoided CO2 emissions					281
	Total	$ 5,225	$ 2,744	$ 2,744	$ 4,148	$ 4,429
Costs:	- Utility DSM program admin. costs	$ -	100	100	100	100
	- Utility DSM program rebate costs		572	572		
	- Revenue reduction to utility			3,249		
	- Participants incremental capital cost	1,908			1,908	1,908
	- Cost to replace lost space heating	1,354			1,354	1,354
	Total	$ 3,262	$ 672	$ 3,921	$ 3,362	$ 3,362
	Net benefit (cost)	$ 1,962	$ 2,072	$ (1,177)	$ 786	$ 1,067
	Benefit / cost ratio	1.60	4.08	0.70	1.23	1.32

Inputs and Assumptions

Equipment life	years	20	
Present value factor for 20 years at 7.9 % discount rate is		9.9	
Average annual Transmission & Distribution losses	%	7.5	
Estimated T & D losses at system peak	%	15	
Utility avoided capacity purchase:			
- participant load reduction at time of system peak	kW	0.85	
- price of purchased capacity	$ / kW - year	56	
- present value is	$	637	
Utility avoided energy supply cost:			
- annual energy saving by participants	kWh	2,189	
- price of purchased energy	$ / kWh	0.09	
- present value is	$	2,107	
Reduction in participant's bills:			
- retail energy charge for electricity	$ / kWh	0.15	
- present value is	$	3,249	
Rebate to participants:			
- higher price for white LED pot light (new install)	$	40.00	
- portion rebated to participants	%	30	
- participants rebate	$	12.00	
Cost to replace lost space heating:			
- furnace oil equivalent of annual energy savings	litres	274	(1 litre = 8 kWh)
- portion of energy savings that provided space heating	%	66.7	(8 month htg season)
- assumed furnace oil price	$ / litre	0.75	
- present value of cost for additional furnace oil	$	1,354	
Benefit of avoided CO2 emissions:			
- assumed CO2 emissions rate	kg / kWh	0.60	
- assumed price of CO2 emissions	$ / tonne	20	
- present value is	$	281	

Annual saving with white LED pot light is	45.9	kWh ((65 W - 11 W) x 850 h)
Reduction in customer load for one unit is	0.054	kW (65 W - 11 W)
Assume average reduction at system peak is	0.018	kW (33 % on at time of system peak)
For 0.85 kW of customer reduction at peak,	47.7	units are required

Benefit Cost Analysis for Energy Start Dehumidifier Rebate
(For 1.0 kW of System Peak Load Reduction)

Appendix 3
Schedule 3.6

10-08-26

		Participant test	Utility test	Rate impact test	Total resource cost test	Societal cost test
Benefits:	- Utility avoided capacity purchase	$ -	$ -	$ -	$ -	$ -
	- Utility avoided energy supply cost		1,281	1,281	1,281	1,281
	- Reduction in participants' bills	1,976				
	- Incentive rebate to participants	459				
	- Value of avoided CO2 emissions					171
	Total	$ 2,435	$ 1,281	$ 1,281	$ 1,281	$ 1,452
Costs:	- Utility DSM program admin. costs	$ -	100	100	100	100
	- Utility DSM program rebate costs		459	459		
	- Revenue reduction to utility			1,976		
	- Participants incremental capital cost	918			918	918
	- Cost to replace lost space heating	0			0	0
	Total	$ 918	$ 559	$ 2,535	$ 1,018	$ 1,018
	Net benefit (cost)	$ 1,517	$ 722	$ (1,253)	$ 263	$ 434
	Benefit / cost ratio	2.65	2.29	0.51	1.26	1.43

Inputs and Assumptions

Equipment life	years	11	
Present value factor for 11 years at 7.9 % discount rate is		7.2	
Average annual Transmission & Distribution losses	%	7.5	
Estimated T & D losses at system peak	%	15	
Utility avoided capacity purchase:			
- participant load reduction at time of system peak	kW	0.85	
- price of purchased capacity	$ / kW - year	56	
- present value is	$	462	
Utility avoided energy supply cost:			
- annual energy saving by participants	kWh	1,836	
- price of purchased energy	$ / kWh	0.09	
- present value is	$	1,281	
Reduction in participant's bills:			
- retail energy charge for electricity	$ / kWh	0.15	
- present value is	$	1,976	
Rebate to participants:			
- higher price for ENERGY STAR dehumidifier	$	50.00	
- portion rebated to participants	%	50	
- participants rebate	$	25.00	
Cost to replace lost space heating:			
- furnace oil equivalent of annual energy savings	litres	230	(1 litre = 8 kWh)
- portion of energy savings that provided space heating	%	-	(summer only usage)
- assumed furnace oil price	$ / litre	0.75	
- present value of cost for additional furnace oil	$	-	
Benefit of avoided CO2 emissions:			
- assumed CO2 emissions rate	kg / kWh	0.60	
- assumed price of CO2 emissions	$ / tonne	20	
- present value is	$	171	

Annual saving with Energy Star dehumidifier	100	kWh (10 ltr / day x 90 days at 1.5 vs 1.8 ltr / kWh)
Average reduction in customer load is	0.0463	kW (100 kWh / (90 days x 24 h / day))
Assume average reduction at system peak is	0.0000	kW (summer only usage)
For 0.85 kW of customer load reduction,	18.4	units are required

Benefit Cost Analysis for Energy Star Clothes Washer Rebate
(For 1.0 kW of System Peak Load Reduction)

10-08-26

		Participant test	Utility test	Rate impact test	Total resource cost test	Societal cost test
Benefits:	- Utility avoided capacity purchase	$ -	$ 534	$ 534	$ 534	$ 534
	- Utility avoided energy supply cost		3,004	3,004	3,004	3,004
	- Reduction in participants' MECL bills	4,631				
	- Reduction in participants' fce oil bills	1,737			1,737	1,737
	- Incentive rebate to participants	3,071				
	- Avoided CO2 emissions: electricity					401
	- Avoided CO2 emissions: furnace oil					123
	Total	$ 9,438	$ 3,538	$ 3,538	$ 5,274	$ 5,798
Costs:	- Utility DSM program admin. costs	$ -	100	100	100	100
	- Utility DSM program rebate costs		3,071	3,071		
	- Revenue reduction to utility			4,631		
	- Participants incremental capital cost	6,141			6,141	6,141
	- Cost to replace lost space heating	0			0	0
	Total	$ 6,141	$ 3,171	$ 7,801	$ 6,241	$ 6,241
	Net benefit (cost)	$ 3,297	$ 367	$ (4,264)	$ (967)	$ (443)
	Benefit / cost ratio	1.54	1.12	0.45	0.85	0.93

Inputs and Assumptions

Equipment life	years	14	
Present value factor for 14 years at 7.9 % discount rate is		8.3	
Average annual Transmission & Distribution losses	%	7.5	
Estimated T & D losses at system peak	%	15	
Utility avoided capacity purchase:			
- participant load reduction at time of system peak	kW	0.85	
- price of purchased capacity	$ / kW - year	56	
- present value is	$	534	
Utility avoided energy supply cost:			
- annual electricity saving by participants	kWh	3,723	
- price of purchased energy	$ / kWh	0.09	
- present value is	$	3,004	
Reduction in participant's bills:			
- retail energy charge for electricity	$ / kWh	0.15	
- present value is	$	4,631	
Rebate to participants:			
- higher price for ENERGY STAR clothes washer	$	100.00	
- portion rebated to participants	%	50	
- participants rebate	$	50.00	
Cost to replace lost space heating:			
- furnace oil equivalent of annual energy savings	litres	465	(1 litre = 8 kWh)
- portion of energy savings that provided space heating	%	-	(savings are 50 % dryer
- assumed furnace oil price	$ / litre	0.75	time and 50 % water htg)
- present value of cost for additional furnace oil	$	-	
Benefit of avoided CO2 emissions:			
- assumed CO2 emissions rate	kg / kWh	0.60	
- assumed price of CO2 emissions	$ / tonne	20	
- present value is		401	
Annual reduction in furnace oil for water heating	litres	279	(water htg is 75 % by oil)
Annual CO2 emissions associated with furnace oil saving	tonnes	0.744	

Annual saving with Energy Star clothes washe	97	kWh (387 kWh - 290 kWh)
Average reduction in customer load is	0.0069	kW (97 kWh x (.5 + .5*.25) / 8,760 hours in year)
Assume average reduction at system peak is	0.0138	kW (2.0 times average load)
For 0.85 kW of customer reduction at peak,	61.4	units are required

Benefit Cost Analysis for Refrigerator Roundup Program
(For 1.0 kW of System Peak Load Reduction)

10-08-26

		Participant test	Utility test	Rate impact test	Total resource cost test	Societal cost test
Benefits:	- Utility avoided capacity purchase	$ -	$ 434	$ 434	$ 434	$ 434
	- Utility avoided energy supply cost		4,883	4,883	4,883	4,883
	- Reduction in participants' bills	7,528				
	- Incentive rebate to participant	523				
	- Value of avoided CO2 emissions					651
	Total	$ 8,051	$ 5,317	$ 5,317	$ 5,317	$ 5,968
Costs:	- Utility DSM program admin. costs	$ -	4,285	4,285	4,285	4,285
	- Utility DSM program rebate costs		523	523		
	- Revenue reduction to utility			7,528		
	- Participants incremental capital cost	0			0	0
	- Cost to replace lost space heating	3,138			3,138	3,138
	Total	$ 3,138	$ 4,807	$ 12,336	$ 7,423	$ 7,423
	Net benefit (cost)	$ 4,913	$ 510	$ (7,018)	$ (2,106)	$ (1,455)
	Benefit / cost ratio	2.57	1.11	0.43	0.72	0.80

Inputs and Assumptions

Remaining equipment life (assume year 2000 vintage)	years	10	
Present value factor for 10 years at 7.9 % discount rate		6.7	
Average annual Transmission & Distribution losses	%	7.5	
Estimated T & D losses at system peak	%	15	
Utility avoided capacity purchase			
- participant load reduction at time of system peak	kW	0.85	
- price of purchased capacity	$ / kW - year	56	
- present value is	$	434	
Utility avoided energy supply cost			
- annual energy saving by participant	kWh	7,446	
- price of purchased energy	$ / kWh	0.09	
- present value is	$	4,883	
Reduction in participant's bills			
- retail energy charge for electricity	$ / kWh	0.15	
- present value is	$	7,528	
Rebate to participants			
- incentive payment participant	$	35.00	
Cost to replace lost space heating			
- furnace oil equivalent of annual energy saving	litres	931	(1 litre = 8 kWh)
- portion of energy savings that provided space heating	%	66.7	(8 month htg season)
- assumed furnace oil price	$ / litre	0.75	
- present value of cost for additional furnace oil	$	3,138	
Benefit of avoided CO2 emissions			
- assumed CO2 emissions rate	kg / kWh	0.60	
- assumed price of CO2 emissions	$ / tonne	20	
- present value is	$	651	

Annual usage by second refrigerator is	665	kWh	(assume year 2000 vintage)
Potential ave. reduction in customer load is	0.0759	kW	(665 kWh / 8,760 hours in year)
Assume average reduction at system peak is	0.0569	kW	(assume 75 % are plugged in)
For 0.85 kW of customer reduction at peak	14.9	units are required	

Benefit Cost Analysis for Energy Star Refrigerator Rebate
(For 1.0 kW of System Peak Load Reduction)

10-08-26

		Participant test	Utility test	Rate impact test	Total resource cost test	Societal cost test
Benefits:	- Utility avoided capacity purchas	$ -	$ 608	$ 608	$ 608	$ 608
	- Utility avoided energy supply cos		3,419	3,419	3,419	3,419
	- Reduction in participants' bills	5,270				
	- Incentive rebate to participant	2,023				
	- Value of avoided CO2 emissions					456
	Total	$ 7,294	$ 4,026	$ 4,026	$ 4,026	$ 4,482
Costs:	- Utility DSM program admin. costs	$ -	100	100	100	100
	- Utility DSM program rebate costs		2,023	2,023		
	- Revenue reduction to utilit			5,270		
	- Participants incremental capital cos	3,035			3,035	3,035
	- Cost to replace lost space heating	2,197			2,197	2,197
	Total	$ 5,232	$ 2,123	$ 7,394	$ 5,332	$ 5,332
	Net benefit (cost)	$ 2,062	$ 1,903	$ (3,367)	$ (1,306)	$ (850)
	Benefit / cost ratio	1.39	1.90	0.54	0.76	0.84

Inputs and Assumptions

Equipment life	years	18
Present value factor for 18 years at 7.9 % discount rate		9.4
Average annual Transmission & Distribution losse	%	7.5
Estimated T & D losses at system peal	%	15
Utility avoided capacity purchase		
- participant load reduction at time of system pea	kW	0.85
- price of purchased capacity	$ / kW - year	56
- present value is	$	608
Utility avoided energy supply cos		
- annual energy saving by participant	kWh	3,723
- price of purchased energy	$ / kWh	0.09
- present value is	$	3,419
Reduction in participant's bills		
- retail energy charge for electricit	$ / kWh	0.15
- present value is	$	5,270
Rebate to participants		
- higher price for ENERGY STAR refrigerato	$	75.00
- portion rebated to participant	%	66.7
- participants rebate	$	50.00
Cost to replace lost space heating		
- furnace oil equivalent of annual energy saving	litres	465 (1 litre = 8 kWh)
- portion of energy savings that provided space heatin	%	66.7 (8 month htg season)
- assumed furnace oil price	$ / litre	0.75
- present value of cost for additional furnace c	$	2,197
Benefit of avoided CO2 emissions		
- assumed CO2 emissions rate	kg / kWh	0.60
- assumed price of CO2 emissions	$ / tonne	20
- present value is	$	456

Annual saving with Energy Star refrigerator is	92	kWh (479 kWh - 387 kWh; 479 kWh is max. allowed)
Average reduction in customer load is	0.0105	kW (92 kWh / 8,760 hours in year)
Assume average reduction at system peak i	0.0210	kW (2.0 times average load
For 0.85 kW of customer reduction at peak	40.5	units are required

Benefit Cost Analysis for T12 to T8 Lighting Retrofit
(For 1.0 kW of System Peak Load Reduction)

10-08-26

		Participant test	Utility test	Rate impact test	Total resource cost test	Societal cost test
Benefits:	- Utility avoided capacity purchase	$ -	$ 637	$ 637	$ 637	$ 637
	- Utility avoided energy supply cost		3,930	3,930	3,930	3,930
	- Reduction in participants' bills	6,059				
	- Incentive rebate to participants	2,895				
	- Value of avoided CO2 emissions					524
	Total	$ 8,954	$ 4,567	$ 4,567	$ 4,567	$ 5,091
Costs:	- Utility DSM program admin. costs	$ -	100	100	100	100
	- Utility DSM program rebate costs		2,895	2,895		
	- Revenue reduction to utility			6,059		
	- Participants incremental capital cost	4,340			4,340	4,340
	- Cost to replace lost space heating	1,893			1,893	1,893
	Total	$ 6,233	$ 2,995	$ 9,054	$ 6,333	$ 6,333
	Net benefit (cost)	$ 2,720	$ 1,572	$ (4,487)	$ (1,766)	$ (1,242)
	Benefit / cost ratio	1.44	1.52	0.50	0.72	0.80

Inputs and Assumptions

Equipment life	years	20	
Present value factor for 20 years at 7.9 % discount rate is		9.9	
Average annual Transmission & Distribution losses	%	7.5	
Estimated T & D losses at system peak	%	15	
Utility avoided capacity purchase:			
- participant load reduction at time of system peak	kW	0.85	
- price of purchased capacity	$ / kW - year	56	
- present value is	$	637	
Utility avoided energy supply cost:			
- annual energy saving by participants	kWh	4,083	
- price of purchased energy	$ / kWh	0.09	
- present value is	$	3,930	
Reduction in participant's bills:			
- retail energy charge for electricity	$ / kWh	0.15	
- present value is	$	6,059	
Rebate to participants:			
- cost to achieve 1 kW of customer demand reduction	$ / kW	2,553	
- portion rebated to participants	%	66.7	
- participants rebate	$ / kW	1,703	
Cost to replace lost space heating:			
- furnace oil equivalent of annual energy savings	litres	510	(1 litre = 8 kWh)
- portion of energy savings that provided space heating	%	50	(comm. & inst. bldgs)
- assumed furnace oil price	$ / litre	0.75	
- present value of cost for additional furnace oil	$	1,893	
Benefit of avoided CO2 emissions:			
- assumed CO2 emissions rate	kg / kWh	0.60	
- assumed price of CO2 emissions	$ / tonne	20	
- present value is	$	524	

Energy with 1 kW of reduced custmr demand	2,402	kWh (from results of I. B. Storey Fall 2009 audits)
Assume average reduction at system peak is	0.50	kW (50 % on at time of system peak)
For 0.85 kW of customer reduction at peak,	1.7	kW of overall customer demand reduction required

Technical Potential for Peak Load Reduction

10-08-26

Potential rebate program	Number of households	Units per household	Potential units per household	Average life (years)	Annual turnover (units)	Annual conversions (units)	Number of units for 1 kW peak reduction	Technical potential: Over one year (MW)	Technical potential: Total (MW)
LED Christmas lighting	50,000								9.000
BR30 CFL	50,000		2			5,000	53	0.0951	1.902
bare CFL	50,000	2	8			20,000	38	0.529	7.941
CREE LR6	50,000		2			5,000	48	0.105	2.096
Energy Star dehumidifier	40,000	1		11	3,636		18	0.198	2.179
Energy Star clothes washer	50,000	1		14	3,571		61	0.058	0.814
Refrigerator roundup	40,000	0.2		10	800		15	0.054	0.536
Energy Star refrigerator	50,000	1		18	2,778		40	0.069	1.236
T12 to T8 conversions									1.200

Notes on technical potential for peak load reduction:

- LED Christmas lighting — Estimated 10 MW of incandescant Christmas lighting remaining after Dec 2010. LED uses 90 % less than incandescant
- Refrigerator roundup — NRCan 2007 Survey of Household Energy Use shows that 20 % of households have a second refrigerator. Half of them are 10 years old or less, so an average life of 10 years has been used.
- T12 to T8 conversions — Estimated total potential of 1.2 MW for General Service 1 rate class.

Evaluation of Potential DSM Programs for 2011-2015

10-08-26

	Benefit to cost ratios					Potential for peak load reduction			Utility program costs		
Potential rebate program	Participant test	Utility test	Rate impact test	Total resource cost test	Societal cost test	Technical potential* (MW)	Economic potential (MW)	Achievable 2011 to 2015 (MW)	Incentive rebate ($ / kW)	Program admin. ($ / kW)	Total ($)
LED holiday lighting	1.40	2.62	1.44	1.74	1.78	9.00	9.00	6.00	$ 108	$ 100	$ 1,247,619
BR30 CFL	2.69	6.63	0.75	2.11	2.25	1.90	1.90	0.48	$ 171	$ 100	$ 128,809
Bare CFL	2.28	8.42	0.74	1.62	1.78	7.94	7.94	2.65	$ 57	$ 100	$ 414,706
White LED pot light	1.60	4.08	0.70	1.23	1.32	2.10	2.10	0.52	$ 572	$ 100	$ 352,412
Energy Star dehumidifier	2.65	2.29	0.51	1.26	1.43	0.00			$ 459	$ 100	$ 152,233
Energy Star clothes washer	1.54	1.12	0.45	0.85	0.93	0.81	0				
Refrigerator roundup	2.57	1.11	0.43	0.72	0.80	0.54	0				
Energy Star refrigerator	1.39	1.90	0.54	0.76	0.84	1.24	0				
T12 to T8 conversions	1.44	1.52	0.50	0.72	0.80	1.20	0				
								9.6			

* Notes on technical potential for peak load reduction (also see Schedule 3.1):
- LED holiday lighting — Estimated 10 MW of incandescant holiday lighting remaining after Dec 2010. LED uses 90 % less than incandescant.
- T12 to T8 conversions — Estimated total potential of 1.2 MW for General Service 1 rate class.

The estimated $ 100 / kW for program administration costs is based on the Vermont Energy Investment Corporation report entitled "Energy Efficiency Initiative Designs and Achievable Potential for Prince Edward Island".

APPENDIX 4

LOAD FACTOR FOR SPACE HEATING LOAD AT TIME OF SYSTEM PEAK

Appendix 4 – Load Factor for Space Heating Load at Time of System Peak

The following inputs are needed to calculate the load factor for the electric space heating load at the time of the annual system peak:

- The average temperature at the time of the system peak is – 6ºC; and
- The annual Heating Degree Days (HDD) below 18ºC for Charlottetown is 4,712.

Assuming that the space heating load is directly proportional to the temperature difference below 18ºC then the annual load factor for an electric space heating load at the time of the system peak is 0.54 as calculated below:

18 ºC – (-6 ºC) = 24 Heating Degrees

4,712 HDD/(24 Hearing Degrees x 365 days) = 0.54