ASSOCIATION OF MANITOBA MUNICIPALITIES
MANITOBA MUNICIPAL ENERGYAND WATER EFFICIENCYPROJECT
TOWN OF CARBERRY
FINAL REPORT
FEBRUARY 2006

KGS GROUP
KONTZAMANIS ▪ GRAUMANN ▪ SMITH ▪ MACMILLAN INC.
CONSULTING ENGINEERS & PROJECT MANAGERS

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February 21, 2006 File No. 05-1285-01-1000.2

Association of Manitoba Municipalities
1910 Saskatchewan Avenue West
Portage la Prairie, Manitoba
R1N 0P1

ATTENTION: Mr. Tyler MacAfee

RE: Municipal Energy and Water
Efficiency Study for Carberry – Final Report

Dear Mr. MacAfee:

Enclosed is the Final Report of the Manitoba Municipal Energy and Water Efficiency Study for the Town of Carberry with all comments incorporated.

Included with this submission are 10 hard copies (3 in colour, 7 in black and white) of the report and 10 copies on compact disk in PDF format with searchable text functionality, as requested in the "Request for Proposal". The PDF file consists of the entire report, including the Executive Summary, Sections 1 to 13, and Appendix A to G.

We thank you for giving us the opportunity to work on this project and look forward to continuing this work with the other Municipalities.

Yours Truly,

R. B. Bodnar, P.Eng.
Senior Mechanical Engineer/ Department Head

RBB/jl/sp

EXECUTIVE SUMMARY

The objective of this study was to determine energy and water efficiency opportunities that could enable to town of Carberry to reduce operating costs, conserve resources, and reduce greenhouse gas emissions.

An energy and water efficiency audit was conducted on nine buildings in the Municipality of Carberry. Throughout the course of this audit, water and energy efficiency opportunities were analyzed to determine each building's potential for energy and water savings. The saving opportunities were separated into the following categories:

- Lighting – Replacing the interior and/or exterior lighting with more energy efficient lights and fixtures.
- Envelope – This involves measures that would reduce the heat loss through the building's windows, doors, walls, and roof.
- Motors- Replacing low efficiency motors with higher efficiency motors.
- HVAC- Improving current heating, ventilating, and air conditioning systems.
- Process Equipment: Potential upgrades to ice plants at arenas and curling rinks.
- Water – Replacing high flow water fixtures with water efficient fixtures.

Table E1 shows the energy and water consumption for each of the buildings for the period from August 2004 to August 2005. This year was chosen as it represents a typical year for energy and water consumption. In addition, the most recent year was selected since the conditions of the buildings throughout this time most closely resemble the buildings' current conditions. The buildings included in this audit used natural gas and electricity as their source of energy. The "Energy Density" column in this table is the total energy (electricity and natural gas) consumed in the building divided by the area of the building. This is useful in comparing the energy consumption among the different buildings in Carberry. The pie chart displays the percentage of total energy density for each of the buildings. It ranges from a high of 25% for the Old Office Building to a low of 5% for the Museum and Cultural Centre.

Tables E2 (a) and (b) show overall energy and water saving opportunities for all nine buildings in the Town of Carberry. These tables also include approximate product and installation prices for each measure both with and without incentives (refer to Appendix D for a list of Manitoba Hydro incentives) and simple payback years. The "Simple Payback Years" column is the overall payback period and may vary for individual buildings.

From the energy saving opportunities table (Table E2(a)) it can be seen that the total potential for energy savings in all nine buildings is approximately 700,000 kWh, 37% of the current total energy consumption.

The water saving opportunities table (Table E2(b)) only shows percentages of savings. The reason for this is that none of the buildings audited have water meters and actual water consumption is unknown. Actual water savings in litres/year would therefore be based on rough estimates and would not be accurate. The percentages shown in this table indicate the percent water savings that would result from replacing the current water fixtures in all of the buildings with water efficient fixtures.

In addition to energy, water, and cost savings, other benefits have been identified:

- Reduction in CO_2 emissions resulting in reduced contribution to climate change– the percent reduction is shown at the bottom of each of the energy saving opportunity tables.
- Lowered maintenance costs – (e.g. replacing the current lights with longer lasting bulbs).
- Improved physical comfort – (e.g. reducing infiltration into buildings).

Table E1 Energy Consumption for the Period from August 2004 – August 2005

Site	Energy Density (kWh/m^2)	Area (m^2)	Electricity		Natural Gas		TOTAL ENERGY	
			kWh	Cost	kWh	Cost	kWh	Cost
Office Building	232	336	37,260	$2,727	40,594	$1,812	77,854	$4,540
Old Office Building	625	192	18,080	$1,648	101,893	$4,257	119,973	$5,905
Town Shop	278	432	7,889	$777	112,364	$4,680	120,253	$5,456
Carberry Community Hall	215	824	15,670	$1,356	161,704	$6,663	177,374	$8,019
Museum & Cultural Centre	121	480	10,870	$956	47,340	$2,054	58,210	$3,011
Public Washroom	395	33	13,030	$1,091	0	$0	13,030	$1,091
Fire Hall	201	440	19,630	$1,545	68,696	$2,926	88,326	$4,471
Recycling Building	200	390	1,690	$437	76,425	$3,217	78,115	$3,655
Carberry Plains Community Centre	282	4,081	464,410	$29,235	687,457	$26,969	1,151,867	$56,204
Totals	**2,550**	**7,208**	**588,529**	**$39,773**	**1,296,473**	**$52,578**	**1,885,002**	**$92,351**

Percentage of Total Energy Density for Buildings in Carberry

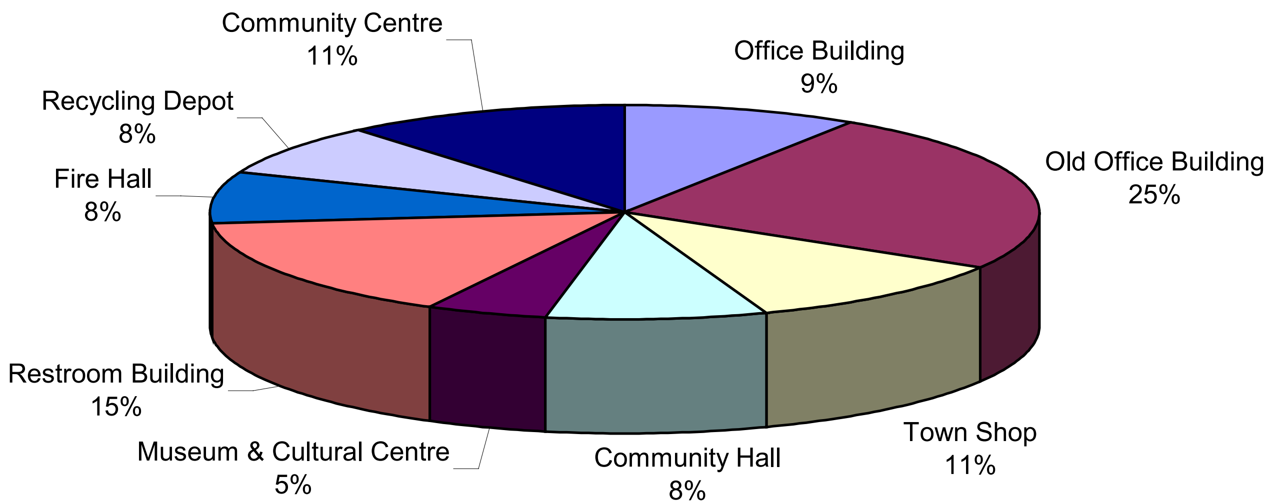

Table E2 (a) Summary of Energy Saving Opportunities for the Town of Carberry Page 1 of 4

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years****		Related Buildings
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*	
LIGHTING											
Replace EXIT incandescent lamps with LED modules.	15	$50	$5	$80	$2,223	$1,454	3,548	$213	10.4	6.8	Office Building, Old Office Building, and Community Hall.
Replace exterior incandescent lamps with high-pressure sodium lights.	17	$130	$93	$130	$5,039	$4,322	4,234	$254	19.8	17.0	Office Building, Old Office Building, Town Shop, Community Hall, Public Washroom, and Fire Hall.
Replace interior incandescent lamps with compact fluorescents.	17	$15	$10	$13	$533	$436	2,398	$144	3.7	3.0	Office Building, Old Office Building, Town Shop, and Community Centre.
Replace interior incandescent lamps with compact fluorescents and put on timer.	4	$35	$30	$33	$310	$287	1,507	$90	3.4	3.2	Public Washroom.
When replacing the interior incandescents, replace them with compact fluorescents	41	$12	$8	$0	$561	$374	1,721	$103	5.4	3.6	Old Office Building, Museum and Cultural Centre, Community Hall, and Recycling Building.
Replace 300W incandescents in hockey rink with metal halides.	12	$150	$50	$100	$3,420	$2,052	4,032	$242	14.1	8.5	Community Centre.
Retrofit 8'x2 T12 fluorescents with T8 ballast and tubes.	10	$75	$40	$75	$1,710	$1,311	1,852	$111	15.4	11.8	Town Shop and Community Centre.
Retrofit 8'x1 T12 fluorescents with T8 ballast and tubes.	8	$65	$30	$65	$1,186	$866	574	$34	34.4	25.1	Community Centre.
Retrofit 4'x4 T12 fluorescents with T8 ballast and tubes.	49	$60	$40	$65	$6,983	$5,865	7,950	$477	14.6	12.3	Office Building.
Retrofit 4'x2 T12 fluorescents with T8 ballast and tubes.	106	$55	$35	$60	$13,897	$11,480	8,448	$507	27.4	22.6	Office Building, Old Office Building, Town Shop, Community Centre, and Community Centre.
Retrofit 4'x2 T12 fluorescents with T8 ballast and tubes and put on timer.	4	$75	$55	$80	$707	$616	1,200	$72	9.8	8.5	Public Washroom.

Table E2 (a) Summary of Energy Saving Opportunities for the Town of Carberry Page 2 of 4

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years****		Related Buildings
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*	
Install parking lot controllers.	8	$100	$75	$150	$2,280	$2,052	2,592	$156	14.7	13.2	Office Building, Old Office Building, and Community Centre.
Install timer on outside pool lights.	1	$40	$40	$100	$160	$160	6,570	$394	0.4	0.4	Community Centre.
Lighting Subtotal					**$39,007**	**$31,274**	**46,625**	**$2,799**			
ENVELOPE											
Replace and weather-strip doors	13	$350	$350	$100	$6,669	$6,669	20,080	$948	7.0	7.0	Old Office Building, Town Shop, Community Hall, Museum and Cultural Centre, and Community Centre.
Replace and weather-strip vehicle doors.	2	$1,000	$1,000	$400	$3,192	$3,192	18,710	$855	3.7	3.7	Town Shop and Recycling Building.
Replace boarded up doors with insulated wall.	2	$350	$350	$800	$2,622	$2,622	4,509	$206	12.7	12.7	Recycling Building.
Replace and weather-strip wood hatch to basement.	1	$250	$250	$100	$399	$399	2,211	$101	3.9	3.9	Old Office Building.
Weather-strip doors.	25	$15	$15	$50	$1,853	$1,853	31,137	$1,496	1.2	1.2	Office Building, Old Office Building, Town Shop, Community Hall, Public Washroom, Fire Hall, Recycling Building, and Community Centre.
Weather-strip vehicle doors.	2	$30	$30	$100	$296	$296	12,412	$567	0.5	0.5	Fire Hall and Community Centre.
Replace and seal windows.	63	$45,200	$36,520	$6,800	$59,280	$49,385	44,355	$2,146	27.6	23.0	Old Office Building, Town Shop, Museum and Cultural Centre, and Community Centre.
Seal windows.	8	$5	$5	$25	$274	$274	4,957	$227	1.2	1.2	Office Building, Old Office Building, Community Hall, Fire Hall, and Recycling Building.
Upgrade wall insulation.	4	$42,455	$42,455	$42,455	$96,797	$96,797	145,462	$8,090	12.0	12.0	Town Shop, Old Office Building, Community Centre.

Table E2 (a) Summary of Energy Saving Opportunities for the Town of Carberry

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years****		Related Buildings
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*	
Upgrade roof insulation.	2	$8,235	$8,235	$8,235	$18,776	$18,776	28,344	$1,295	14.5	14.5	Old Office Building and Town Shop.
Remove window air conditioner and seal.	1	$0	$0	$100	$114	$114	1,026	$62	1.9	1.9	Museum and Cultural Centre.
Envelope Subtotal					**$190,272**	**$180,377**	**313,202**	**$15,993**			
HVAC											
Install programmable thermostat; Setback temp to 15°C (59°F).	13	$300	$300	$300	$8,892	$8,892	48,168	$2,209	4.0	4.0	Office Building, Old Office Building, Town Shop, Community Hall, Public Washroom, and Fire Hall.
Install motorized dampers.	2	$600	$600	$600	$1,368	$1,368	2,440	$123	11.1	11.1	Public Washroom and Community Centre.
Replace furnace/unit heater with high efficiency furnace.	17	$2,000	$2,000	$800	$54,264	$54,264	139,358	$6,369	8.5	8.5	Old Office Building, Town Shop, Community Hall, Museum and Cultural Centre, Fire Hall, and Community Centre.
When replacing furnace, replace with high efficiency furnace.	2	$1,000	$1,000	$0	$2,280	$2,280	6,863	$314	7.3	7.3	Office Building.
Install HRV.	2	$950	$950	$1,000	$4,446	$4,446	7,196	$329	13.5	13.5	Office Building and Old Office Building.
Replace unit heaters with radiant heaters.	2	$1,100	$1,100	$1,000	$4,788	$4,788	11,775	$538	8.9	8.9	Recycling Building.
Install high efficiency condensing unit when current condenser requires replacement.	1	$2,200	$1,957	$0	$2,508	$2,231	1,540	$70	35.6	31.7	Old Office Building.
Use “Tropical Fish” as a liquid solar pool blanket.	12	$20	$20	$0	$274	$274	66,000	$3,016	0.1	0.1	Community Centre.
Install geothermal heating system (not included in totals).	1	$25,120	$25,120	$17,270	$48,325	$48,325	35,301	$1,613	30.0	30.0	Office Building.

Table E2 (a) Summary of Energy Saving Opportunities for the Town of Carberry Page 4 of 4

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years****		Related Buildings
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*	
HVAC Subtototal					**$78,820**	**$78,543**	**283,341**	**$12,968**			
MOTORS											
When replacing 20 HP motors on brine pumps, repace them with high efficiency motors.	2	$1,200	$1,200	$1,000	$5,016	$5,016	945	$57	88.4	88.4	Community Centre.
Motors Subtotal					**$5,016**	**$5,016**	**945**	**$57**			
HOT WATER											
Install water efficient metering faucets.	22	$309	$309	$150	$11,512	$11,512	8,877	$411	28.0	28.0	Office Building, Community Hall, and Community Centre.
Install water efficient showerheads.	5	$21	$21	$50	$405	$405	4,290	$196	2.1	2.1	Community Centre.
Replace water heater with instantaneous water heater.	4	$300	$300	$900	$5,472	$5,472	4,771	$243	22.5	22.5	Old Office Building, Town Shop, Museum and Cultural Centre, and Fire Hall.
Insulate hot water piping.	1	$170	$170	$380	$627	$627	2,559	$130	4.8	4.8	Town Shop, Public Washroom, Fire Hall, Recycling Building, and Community Centre.
Replace 380 MBH pool heaters with high efficiency pool heaters.	2	$4,914	$4,914	$1,000	$13,484	$13,484	28,566	$1,305	10.3	10.3	Community Centre.
Replace zamboni water heater with high efficiency water heater.	1	$6,684	$6,684	$1,000	$8,760	$8,760	7,135	$326	26.9	26.9	Community Centre.
Water Subtotal					**$40,259**	**$40,259**	**56,198**	**$2,612**			

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption /Costs/Emissions	1,884,955	$92,137	250.27
Estimated Annual Savings	700,311	$34,430	101.4
Percent Savings	37%	37%	40%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** The cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro's website) and the cost of natural gas is 0.0457 $/kWh (as of November 1, 2005)
**** This is the overall payback period and may vary for individual buildings (refer to tables throughout report for payback years for a specific building).

Table E2 (b) Summary of Water Saving Opportunities for the Town of Carberry

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)	Related Buildings
		Capital	Labour			
Install water efficient metering faucets.	32	$309	$150	$14,688	80%	Office Building, Old Office Building, Town Shop, Community Hall, Museum and Cultural Centre, Fire Hall, Recycling Building, and Community Centre.
Install water efficient toilets.	39	$284	$150	$16,926	55%	Office Building, Old Office Building, Town Shop, Community Hall, Museum and Cultural Centre, Public Washroom, Fire Hall, Recycling Building, and Community Centre.
Install water efficient showerheads.	5	$21	$50	$355	29%	Community Centre.
Install water efficient urinals.	6	$343	$200	$3,258	60%	Old Office Building, Community Hall, Fire Hall, and Community Centre.

* The total cost column includes 14% taxes.

MMEP AUDITORS

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Association of Manitoba Municipalities
Manitoba Hydro
Manitoba Conservation
Agriculture and Agri-Food Canada – Prairie Farm Rehabilitation Administration
Manitoba Culture, Heritage, and Tourism

FUNDING

Federation of Canadian Municipalities/Green Municipal Fund
Sustainable Development Innovations Fund

This study has been produced with the assistance of the Green Municipal Enabling Fund, a fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the author(s); the Government of Canada and the Federation of Canadian Municipalities accept no responsibility for them.

Additional support for the MMEP Project provided by Manitoba Conservation, Sustainable Development Innovations Fund.

ACKNOWLEDGEMENTS

KGS Group and the MMEP partners gratefully acknowledge the valuable contributions the following people have made in providing their time, helpful suggestions, and participation in this energy and water efficiency project:

- Brent McMillan (Municipal Office)
- Frant Aarts (Town Shop)
- Robert Ohrling (Community Hall)
- Keith Loney (Community Centre)

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1.0 INTRODUCTION

1.1 BACKGROUND

Energy and water conservation is becoming more important as environmental concerns grow and energy costs increase. For this reason it is important to perform energy and water efficiency audits to identify practical efficiency improvement opportunities and determine the capital costs and payback periods associated with these implementations.

An energy and water efficiency audit was conducted on nine buildings in the Municipality of Carberry to determine how these buildings could reduce both energy and water consumption.

1.2 OBJECTIVE

The objective of this study was to determine energy and water efficiency opportunities that could enable the Town of Carberry to reduce operating costs, conserve resources, and reduce greenhouse gas emissions. All nine buildings in the Town of Carberry were analyzed separately and the results are presented in separate sections throughout this report.

1.3 METHODOLOGY

The buildings were toured on September 29 and 30, 2005 by Mr. Ray Bodnar, P.Eng. of KGS Group Engineering Consultants. These tours involved a walkthrough of each of the buildings to determine the current condition of the building's envelope (walls, roof, windows, and doors), lighting, water fixtures, motors, and heating, ventilation and air conditioning (HVAC) systems.

During the building tours, the auditor met with the Town of Carberry's Chief Administrative Officer Brent McMillan to discuss the study objectives for identifying energy and water saving opportunities, and to provide information on existing incentive programs. At this time, it was determined that there is currently a construction project underway for the Carberry Plains Community Centre. Details of these plans can be found in Section 10.3. While auditing the buildings, whenever possible, on-site training was done to inform the staff on energy and/or water saving opportunities in specific buildings and to point out maintenance issues where applicable.

Using the information collected during the audit, available drawings of the buildings, historical weather data, and the hydro bills from the past 12 months, calculations were performed to determine how each of the buildings are consuming energy and water. Several assumptions were made throughout these calculations including occupancies, room temperatures, and envelope conditions (see Inventory Sheets in Appendix A). When no drawings were available, wall/roof R-values were assumed based on discussions with site personnel or based on knowledge of other buildings of similar type/age to the building surveyed.

Energy Saving Opportunities (ESOs) were developed for each building and are presented in tables throughout this report showing energy savings, cost savings, installation costs, and simple payback periods. Simple Payback Periods are calculated as the total installation cost divided by the annual cost savings. The installation costs include the capital costs, both with and without incentives (see Appendix D for a list of Manitoba Hydro incentives), and the labour costs for the installation using standard contractor rates. The total energy savings, the percent energy savings, and the associated costs are presented at the end of each ESO table. It should be noted that the energy savings and capital cost estimates are preliminary. For complex measure such as geothermal heating / cooling, a more detailed investigation would be required to confirm capital and installation costs for this system.

An environmental benefit that results from reducing energy consumption is a reduction in CO_2 emissions. CO_2 is a greenhouse gas and thus contributes to global warming. By reducing natural gas and electrical energy consumption, CO_2 emissions are reduced. At the bottom of each ESO table, the total CO_2 reduction resulting from the energy savings is shown. This was calculated using a CO_2 emissions calculator produced by Natural Resources Canada.

Many of the ESOs have low installed costs and payback periods of less than two years. Once the implementation phase begins, these ESOs are the most attractive measures. However, in order to maximize long-term savings and efficiencies for the buildings, implementation of the more capital-intensive measures with the longer payback periods is necessary. These items will become more attractive as energy costs increase in the future. It is recommended that the savings associated with the short payback ESOs be reinvested annually as a means to help finance the more expensive options.

Water Saving Opportunities (WSOs) are also presented in this report. The WSOs include installing water efficient sink faucets, toilets, urinals, and showers. Since none of the buildings have water meters, the savings are shown as percentages of the current fixtures water consumption.

2.0 OFFICE BUILDING

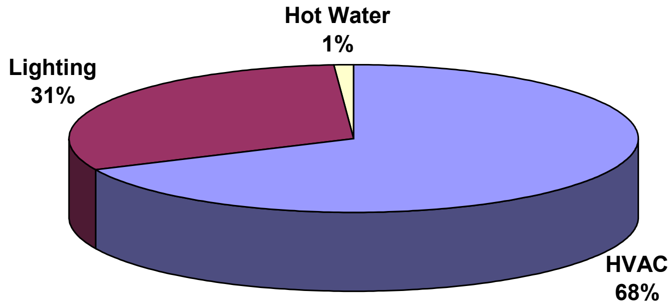
2.1 BACKGROUND

Carberry's Office Building is 3,600 square feet and was built in approximately 1990. It consists of 6" thick walls with concrete block on the exterior of the east wall and stucco on the other three walls. This building contains offices that are occupied Monday to Friday, from 8:30 am to 4:30 pm year round. Minor renovations were recently done on the interior; however, none of these renovations effected the building's energy consumption.

Photo 1 – Office Building

The Office building uses natural gas for heating and electricity for lighting, water heating, and cooling in the summer. The total natural gas and electrical energy consumption for the previous year were 40,592 kWh and 37,260 kWh, respectively. The pie chart below shows the total energy (natural gas and electricity) breakdown for the Office Building.

Energy Breakdown (% of Total kWh) for the Office Building



A well inside the building supplies the washroom with water. There are currently two high flow toilets and two high flow sinks in the washroom. The hot water consumed by the water fixtures in the washroom was calculated by estimating the occupancy of the building and the frequency at which the fixtures are used. A total annual hot water consumption was then established.

2.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 1 and 2 show a summary of both the energy and water saving opportunities for the Office Building. The following assumptions were made in determining the annual savings:

- The Offices are occupied for 40 hours per week year round.
- The temperature of the Office is maintained at 21°C (70°F).
- For the purpose of hot water consumption, the typical occupancy of the office is taken as 8.
- The exit lamps are on 24 hours per day year round and the outdoor lights are on 12 hours per day year round.

Table 1 Energy Saving Opportunities for the Office Building

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace EXIT incandescent lamps with LED modules.	3	$50	$5	$80	$445	$291	710	$43	10.4	6.8
Replace exterior incandescent lamps with high-pressure sodium lights.	1	$130	$93	$130	$296	$254	329	$20	15.0	12.9
Retrofit 4' x 4 T12 fluorescents with T8 ballast and tubes.	49	$60	$40	$65	$6,983	$5,865	7,950	$477	14.6	12.3
Retrofit 4' x2 T12 fluorescents with T8 ballast and tubes.	2	$55	$35	$65	$274	$228	162	$10	28.1	23.4
Replace interior incandescents with compact fluorescents.	2	$15	$10	$13	$63	$51	300	$18	3.5	2.9
Install parking lot controllers.	3	$100	$75	$150	$855	$770	936	$56	15.2	13.7
Lighting Subtotal					**$8,915**	**$7,459**	**10,386**	**$624**		
ENVELOPE										
Weather-strip doors.	2	$15	$15	$50	$148	$148	3,474	$159	0.9	0.9
Seal windows.	3	$5	$5	$25	$103	$103	2,501	$114	0.9	0.9
Envelope Subtotal					**$251**	**$251**	**5,975**	**$273**		
HVAC										
Install programmable thermostat; setback temp to 15°C (59°F).	2	$300	$300	$300	$1,368	$1,368	5,107	$233	5.9	5.9
When replacing furnaces, replace them with 95% efficient furnaces.	2	$1,000	$1,000	$0	$2,280	$2,280	6,863	$314	7.3	7.3
Install HRVs.	1	$950	$950	$1,000	$2,223	$2,223	4,067	$186	12.0	12.0
Install geothermal heating system (not included in totals).	1	$25,120	$25,120	$17,270	$48,325	$48,325	35,301	$1,613	30.0	30.0
HVAC Subtototal					**$5,871**	**$5,871**	**16,037**	**$733**		
HOT WATER										
Install water efficient metering faucets.	2	$309	$309	$150	$1,046	$1,046	393	$24	44.3	44.3
Water Subtotal					**$1,046**	**$1,046**	**393**	**$24**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption/Costs/Emissions	77,852	$4,540	8.39
Estimated Annual Savings	32,791	$1,653	4.27
Percent Savings	42%	36%	51%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** The cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro's website) and the cost of natural gas is 0.0457 $/kWh (as of November 1, 2005).

Table 2 Water Saving Opportunities for the Office Building

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	2	$309	$150	$1,047	80%
Install water efficient toilets	2	$284	$150	$990	55%

* The total cost column includes 14% taxes.

2.3 GENERAL RECOMMENDATIONS

Lighting

The lighting analysis summary for the Office is shown in Appendix B, Table B.1.3. The 4'x4 T12 fluorescent bulbs consume the majority of the electricity. Although the initial cost of replacing the T12s with T8s is high, significant savings would result from this upgrade. The energy consumption from the exit signs can be reduced to 10% of the current consumption by replacing the incandescent bulbs with LEDs. The most economical upgrade that can be made is to replace the interior incandescent bulbs with compact fluorescents; however, since there are only 2 incandescent bulbs, the annual energy savings is low.

Envelope

The walls and roof of the Office Building currently have adequate insulation and the doors and windows are of good quality design. The only suggestions in terms of the building's envelope are to weather-strip and seal the windows and doors. This upgrade has a very low initial cost and would eliminate the majority of infiltration through cracks around the windows and doors with a short payback period. Table B.1.4 in Appendix B shows details on these calculations.

HVAC

The office is heated using two 80% efficiency furnaces. When the time comes to replace these furnaces, installing high efficiency furnaces would result in energy savings with a payback period of just over 5 years.

Another option for improving the efficiency of the heating system is to install a geothermal heating system. The existing gas furnaces would be replaced with water-to-air heat pumps connected to a closed loop ground water system. A geothermal heat pump is one of the most energy efficient and environmentally friendly electric heating and cooling systems available and would cut annual heating costs by almost 40%. However, the installation cost for this upgrade is high resulting in a long payback period. Since replacing the furnaces with high efficiency furnaces is more economical than a geothermal heating system, the geothermal heating system option is not included in the Totals.

Installing setbacks on the thermostats could result in energy savings with a very short payback period. The offices are unoccupied for approximately 70% of the time; the thermostats should be programmed such that when the building is unoccupied, the temperature is reduced to 15°C (59°F).

Installing a heat recovery ventilator (HRV) would pre-heat the intake air to the furnace and would save approximately 50% of the energy required to heat the intake air.

Water

Exact water savings in litres are not shown in Table 2 above; however, Table B.1.5 in Appendix B shows estimated water consumption results that were calculated based on typical water fixtures and estimations of the occupancy of the Office Building.

Replacing the toilets and sink faucets in the washroom would save over 55% of the current water consumption. In addition, installing water efficient metering faucets would save in energy required to heat the water.

3.0 OLD OFFICE BUILDING

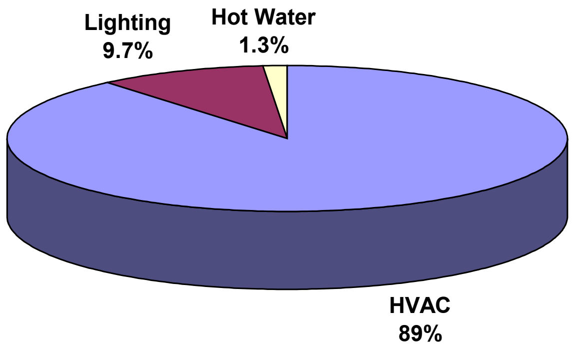
3.1 BACKGROUND

The Old Office Building is a heritage building constructed in 1907. The building is 2,070 square feet and was constructed of masonry walls with interior wood paneling. The main floor offices are occupied from Monday to Friday 8:30 am to 4:30 pm year round. A meeting room in the basement is occupied for approximately 4 hours per week.

Photo 2 – Old Office Building

The Old Office Building is serviced with both electricity and natural gas. The annual electricity consumption for this building in the previous year was 18,000 kWh and was used for lighting and air conditioning. Natural gas is used in both the furnace and the hot water heater. The total energy consumption through the use of natural gas for the previous year was just over 100,000 kWh. The pie chart below shows the portions of the total energy consumption used for lighting, water heating, and building heat.

Energy Breakdown (% of Total kWh) for the Old Office Building



An individual well supplies water to the washrooms in this building. There are a total of 4 toilets, 4 sinks, and 1 urinal in this facility; all the water fixtures are currently high flow. The hot water consumed by the water fixtures in the washrooms was calculated by estimating the occupancy of the building and the frequency at which the fixtures are used. A total annual hot water consumption was then established.

3.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 3 and 4 show a summary of energy and water saving opportunities for the Old Office Building. The following assumptions were made in the analysis:

- The main floor of the Old Office Building is occupied for 40 hours per week year round and the basement is occupied for 4 hours per week year round.
- The temperature of the offices is maintained at 21°C (70°F).
- For the purpose of water consumption, the typical occupancy of this building is 7.
- The exit lamps are on 24 hours per day year round and the outdoor lights are on 12 hours per day year round.

Table 3 Energy Saving Opportunities for the Old Office Building

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace EXIT incandescent lamps with LED modules.	4	$50	$5	$80	$593	$388	946	$57	10.4	6.8
Replace exterior incandescent lamps with high-pressure sodium lights.	3	$130	$93	$130	$889	$763	394	$24	37.6	32.2
Retrofit main floor 4' x 2 T12 fluorescents with T8 ballast and tubes.	33	$55	$35	$60	$4,326	$3,574	2,677	$161	26.9	22.2
Replace basement incandescents with compact fluorescents.	9	$13	$8	$0	$133	$82	135	$8	16.5	10.1
Replace main floor incandescents with compact fluorescents.	3	$15	$10	$13	$94	$77	449	$27	3.5	2.9
Install parking lot controllers.	3	$100	$75	$150	$855	$770	936	$56	15.2	13.7
Lighting Subtotal					**$6,891**	**$5,653**	**5,537**	**$332**		
ENVELOPE										
Replace and weather-strip wood door to basement.	1	$350	$350	$100	$513	$513	1,200	$55	9.4	9.4
Replace and weather-strip wood hatch to basement.	1	$250	$250	$100	$399	$399	2,211	$101	3.9	3.9
Weather-strip pedestrian doors.	2	$15	$15	$50	$148	$148	4,357	$199	0.7	0.7
Seal window in front door.	1	$5	$5	$25	$34	$34	871	$40	0.9	0.9
Replace windows.	26	$17,100	$14,200	$2,400	$22,230	$18,924	24,401	$1,115	19.9	17.0
When replacing roof, upgrade roof insulation.	1	$5,168	$5,168	$5,168	$11,782	$11,782	14,243	$651	18.1	18.1
Upgrade wall insulation.	1	$6,987	$6,987	$6,987	$15,930	$15,930	9,825	$449	35.5	35.5
Envelope Subtotal					**$51,036**	**$47,730**	**48,970**	**$2,238**		
HVAC										
Install programmable thermostat; setback temp to 15°C (59°F).	1	$300	$300	$300	$684	$684	4,565	$209	3.3	3.3
Replace furnace with high efficiency furnace.	2	$2,000	$2,000	$800	$6,384	$6,384	30,703	$1,403	4.5	4.5
Install high efficiency condensing unit when current condenser requires replacement.	1	$2,200	$1,957	$0	$2,508	$2,231	1,540	$70	35.6	31.7
Install HRV.	1	$950	$950	$1,000	$2,223	$2,223	3,129	$143	15.5	15.5
HVAC Subtototal					**$11,799**	**$11,522**	**39,937**	**$1,825**		
HOT WATER										
Install instantaneous hot water heater.	1	$300	$300	$900	$1,368	$1,368	1,164	$53	25.7	25.7
Water Subtotal					**$1,368**	**$1,368**	**1,164**	**$53**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption /Costs/Emissions	119,913	$5,690	18.84
Estimated Annual Savings	103,746	$4,821	17.84
Percent Savings	87%	85%	95%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** The cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro's website) and the cost of natural gas is 0.0457 $/kWh (as of November 1, 2005).

Table 4 Water Saving Opportunities for the Old Office Building

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	4	$309	$150	$2,093	80%
Install water efficient toilets.	4	$284	$150	$1,979	55%
Install water efficient urinals.	1	$344	$200	$620	60%

* The total cost column includes 14% taxes.

3.3 GENERAL RECOMMENDATIONS

Lighting

The T12 fluorescent bulbs in the basement are not included in Table 3 above. The reason for this is that they are used so infrequently that the payback period is very long. Since the T12s on the main floor are used daily, they are included in Table 3 above; however, the payback period is still long due to the high installation costs. Replacing the exit sign incandescent lamps with LEDs would result in savings with a more realistic payback period since they run 24 hours a day regardless of the occupancy. Replacing the incandescent bulbs on the main floor with compact fluorescent bulbs would also result in energy savings with a short payback period. Replacing the incandescent bulbs in the basement, however, would have a longer payback period since the lights are rarely on. The lighting analysis summary table is shown in Appendix B as Table B.2.3.

Envelope

During the winter, a large amount of heat is lost through the building's envelope. This annual heat loss can be reduced by upgrading the building's roof and wall insulation, by replacing the old windows and doors with more energy efficient windows and doors, and by weather-stripping and sealing the cracks around the windows and doors.

Since this is a heritage building, the wall insulation should be upgraded from the interior. The savings were calculated based on the assumption that the current wall insulation is R-12. Due to the high installation costs involved in upgrading the insulation from the interior, the payback period for this upgrade is long. The roof insulation should be upgraded from the exterior. Since this involves removing the roof, this upgrade should be done when the roof requires replacement. The results from these calculations are shown in Appendix B, Table B.2.4.

HVAC

The gas furnaces in this building are 30 years old and are approximately 60% efficient. Replacing these furnaces with 95% efficient furnaces would save 35% of the annual energy consumption for heating the office. In addition, programmable thermostats should be installed to help reduce heating costs when the building is unoccupied. The thermostats should be setback to 15°C (59°F) for evenings and weekends.

Installing a heat recovery ventilator (HRV) would pre-heat the intake air to the furnace. This would save approximately 50% of the energy required to heat this air.

When the current condensing unit requires replacement, consideration should be given to installing a high efficiency condenser. Replacing a standard condensing unit (EER = 8.5) with a premium efficiency unit (EER=13) would save 35% of the annual energy used for cooling.

Water

An energy saving opportunity shown in Table 3 is to install an instantaneous water heater. This upgrade is recommended for facilities with low amounts of hot water consumption. With an instantaneous water heater there is no storage tank; therefore, the heat loss that is present with the current water heater's storage tank would be eliminated.

The water analysis summary is shown in Table B.2.5 in Appendix B. Replacing the current high flow water fixtures with water efficient fixtures would reduce the water consumed by these fixtures by 55 to 80%.

4.0 TOWN SHOP

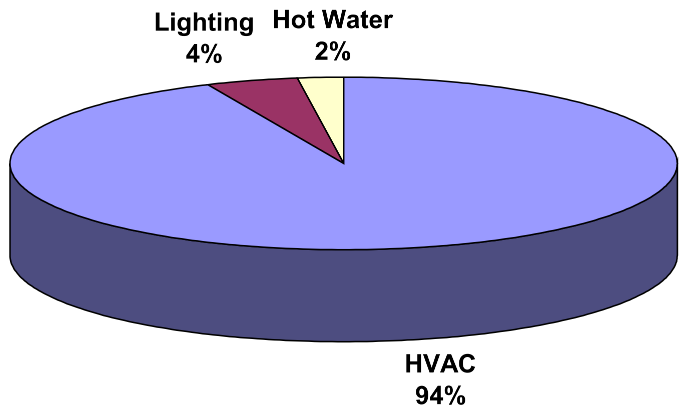
4.1 BACKGROUND

The Town Shop is a 4,650 square foot building consisting of four separate rooms: a workshop, a pump room, and two vehicle storage rooms. The portion of the building that houses the two vehicle storage rooms and the pump room is approximately 60 years old and was constructed of brick walls with no insulation and a stucco exterior. In 1970, a 2,000 square foot addition was constructed of wood framing with a wood liner interior wall and stucco on the exterior; this addition now houses the workshop. The Town Shop is occupied from Monday to Friday, 8:30 am to 4:30 pm.

Photo 3 – Town Shop

The shop is heated with gas unit heaters; these heaters consumed a total of 112,367 kWh in the previous year. The total electricity consumption for the previous year was 7,889 kWh and was used for lighting and hot water heating. The total energy breakdown is shown in the following pie chart.

Energy Breakdown (% of Total kWh) for the Town Shop



An individual well supplies the water to the shop. There are no water meters in this facility to measure the actual water usage in the washroom; therefore, calculating the energy used to heat the water involved making assumptions on the frequency at which the sink faucets are used.

4.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 5 and 6 show summaries of the energy and water efficiency improvement opportunities for the Town Shop. The following assumptions were made in the calculations:

- The Town Shop is occupied for 40 hours per week.
- The temperature of the shop is maintained at 21°C (70°F) and the other three rooms are at 0°C (32°F).
- For the purpose of water consumption, the typical occupancy of the shop is 3.

Table 5 Energy Saving Opportunities for the Town Shop

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace exterior incandescent lamps with high-pressure sodium lights.	1	$130	$93	$130	$296	$254	219	$13	22.5	19.3
Retrofit 4' x 2 T12 fluorescents with T8 ballast and tubes.	1	$55	$35	$60	$131	$108	81	$5	26.9	22.2
Retrofit 8' x 2 T12 fluorescents with T8 ballast and tubes.	6	$75	$40	$75	$1,026	$787	1,032	$62	16.6	12.7
Replace interior incandescents with compact fluorescents.	8	$15	$10	$13	$251	$205	1,198	$72	3.5	2.9
Lighting Subtotal					**$1,704**	**$1,354**	**2,530**	**$152**		
ENVELOPE										
Replace and weather-strip vehicle door.	1	$1,000	$1,000	$400	$1,596	$1,596	10,100	$462	3.5	3.5
Replace and weather-strip pedestrian old door.	1	$350	$350	$100	$513	$513	2,694	$123	4.2	4.2
Weather-strip new pedestrian door.	1	$15	$15	$50	$74	$74	1,737	$79	0.9	0.9
Replace windows.	4	$3,000	$2,520	$800	$4,332	$3,785	7,396	$338	12.8	11.2
Upgrade wall insulation (for vehicle storage rooms and pump room).	1	$9,688	$9,688	$9,688	$22,089	$22,089	9,544	$436	50.6	50.6
Upgrade wall insulation (for shop).	1	$9,280	$9,280	$9,280	$21,158	$21,158	25,490	$1,165	18.2	18.2
Upgrade roof insulation (everywhere except shop).	1	$3,067	$3,067	$3,067	$6,993	$6,993	14,101	$644	10.9	10.9
Envelope Subtotal					**$56,756**	**$56,208**	**71,061**	**$3,248**		
HVAC										
Install programmable thermostat; Setback temp to 15°C (59°F).	4	$300	$300	$300	$2,736	$2,736	5,742	$262	10.4	10.4
Replace unit heaters with high efficiency furnaces.	4	$2,000	$2,000	$800	$12,768	$12,768	16,959	$775	16.5	16.5
HVAC Subtototal					**$15,504**	**$15,504**	**22,701**	**$1,037**		
HOT WATER										
Replace hot water tank with instantaneous water heater.	1	$300	$300	$900	$1,368	$1,368	1,746	$105	13.1	13.1
Insulate hot water piping.	1	$25	$25	$25	$57	$57	233	$14	4.1	4.1
Water Subtotal					**$1,425**	**$1,425**	**1,979**	**$119**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption /Costs/Emissions	120,256	$5,456	20.44
Estimated Annual Savings	98,271	$4,556	16.96
Percent Savings	82%	83%	83%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** The cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro's website) and the cost of natural gas is 0.0457 $/kWh (as of November 1, 2005).

Table 6 Water Saving Opportunities for the Town Shop

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	1	$309	$150	$523	80%
Install water efficient toilets.	1	$284	$150	$495	55%

* The total cost column includes 14% taxes.

4.3 GENERAL RECOMMENDATIONS

Lighting

The lighting analysis results for the Town Shop can be found in Appendix B, Table B.3.3. The best opportunity for energy savings in lighting is to replace the incandescent bulbs with compact fluorescent bulbs; this results in the largest energy savings with the shortest payback period when compared to the other lighting upgrades. Replacing the 8' T12 fluorescent lights with T8s would also reduce the annual energy consumption.

Envelope

Annual energy savings would result from replacing the old wood pedestrian door and one of the vehicle doors to the workshop with insulated doors. There is also cold air leaking through the cracks around these doors; this would be eliminated with new weather-stripping. The four windows to the workshop are currently only single pane windows. Replacing these with triple pane windows would result in significant energy savings.

None of the Town Shop's walls are insulated and the roof of the older section has very little insulation. Insulating the walls of the newer portion of the building would involve removing the wood paneling, inserting 6" batt insulation in the cavity, and putting up drywall. Since these walls make up such a large portion of the building, significant energy savings would result from this upgrade.

The insulation in the older portion of the building would be much more costly to upgrade since the interior walls are brick. The payback period for this opportunity is much higher due to the high installation cost ($7/ft^2).
Upgrading the roof insulation would simply involve adding batt insulation in the attic. Large energy savings would result from this upgrade with only a 10-year payback period. The analysis on the envelope for the Town Shop is shown in Appendix B, Table B.3.4.

HVAC

Installing a programmable thermostat in the workshop would help reduce the annual energy consumption. The thermostat should be setback to 15°C (59°F) when the shop is unoccupied (evenings and weekends).

The unit heaters are only 80% efficient. Replacing these heaters with high efficiency furnaces would result in a 15% reduction in the annual gas consumption.

Water

The hot water tank and piping in the Town Shop are poorly insulated resulting in heat loss year round. Replacing the hot water heater with an instantaneous water heater would eliminate the energy required to keep the water in the storage tank hot. Water usage savings of over 55% would result from installing new metering faucets and toilets in the washroom. This water analysis is shown in Appendix B, Table B.3.5.

Other Issues

The Town Shop uses the Recycling Building for off-season storage of their equipment. This building has better insulation than the Town Shop and is underutilized. An option to consider is to relocate the Town Shop activities to the Recycling Building and shut down operations in the Town Shop, thus saving a large amount of energy for heating and lighting. Capital costs associated with upgrading the Town Shop would also be saved.

5.0 COMMUNITY HALL

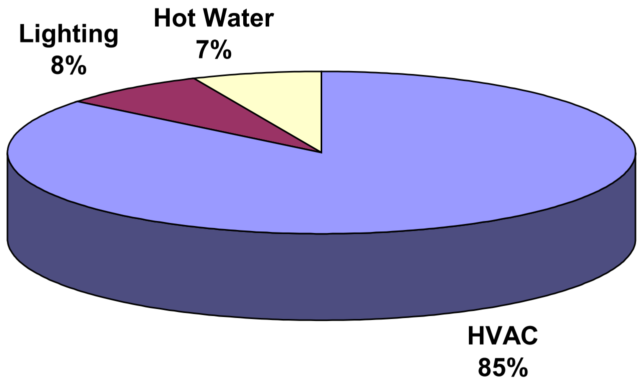
5.1 BACKGROUND

The Community Hall is an 8,900 square foot wood frame building with wood paneling on the inside and vinyl siding on the outside walls. The building was constructed in 1961 and consists of a small and a large hall, a kitchen, and washrooms. The roof of the large hall recently collapsed and is being repaired. In addition to repairing the roof, other renovations will be done including new energy efficient T5 fluorescent lighting in the large hall and upgraded insulation in the roof.

Photo 4 – Community Hall

In the previous year, a total of 160,000 kWh of natural gas energy was consumed for heating the hall and for a portion of the water heating, and 16,000 kWh of electricity was used for lighting, air conditioning, water well pump motors, and for the electric water heater. The pie chart below shows the breakdown of energy consumption for this building.

Energy Breakdown (% of Total kWh) for the Community Hall



An individual water well supplies water to the Community Hall. The washrooms in the hall have a total of 9 toilets, 10 sinks, and two urinals that are all high flow fixtures. There are no water meters at this facility so assumptions were made on the frequency with which the water fixtures are used.

5.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 7 and 8 show summaries of the energy and water saving opportunities for the Community Hall. The following assumptions were made in the calculations:

- The Community Hall is occupied three times a week for 8 hours.
- The temperature of the Community Hall is maintained at 21°C (70°F).
- For the purpose of water consumption, typical occupancy of the hall is 200.

Table 7 Energy Saving Opportunities for the Carberry Community Hall

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace exit incandescent lamps with LED modules.	8	$50	$5	$80	$1,186	$775	1,892	$114	10.4	6.8
Replace exterior incandescent lamps with high-pressure sodium lights.	6	$130	$93	$130	$1,778	$1,525	1,314	$79	22.5	19.3
Retrofit 4' x 2 T12 fluorescents with T8 ballast and tubes.	41	$55	$35	$60	$5,375	$4,440	3,689	$221	24.3	20.0
When replacing the interior incandescents, replace them with compact fluorescents.	8	$12	$8	$0	$109	$73	719	$43	2.5	1.7
Lighting Subtotal					**$8,449**	**$6,814**	**7,614**	**$457**		
ENVELOPE										
Replace and weatherstrip double wood door on east wall.	1	$700	$700	$200	$1,026	$1,026	5,214	$238	4.3	4.3
Replace and weatherstrip pedestrian door on east wall.	1	$350	$350	$100	$513	$513	3,215	$147	3.5	3.5
Weatherstrip pedestrian doors.	5	$15	$15	$50	$371	$371	8,685	$397	0.9	0.9
Seal window	1	$5	$5	$25	$34	$34	347	$16	2.2	2.2
Envelope Subtotal					**$1,944**	**$1,944**	**17,462**	**$798**		
HVAC										
Install programmable thermostat; Setback temp to 15°C (59°F).	3	$300	$300	$300	$2,052	$2,052	19,726	$902	2.3	2.3
Replace furnaces with 95% efficient furnaces.	3	$2,000	$2,000	$800	$9,576	$9,576	22,656	$1,035	9.2	9.2
HVAC Subtototal					**$11,628**	**$11,628**	**42,383**	**$1,937**		
HOT WATER										
Install water efficient metering faucets.	10	$309	$309	$150	$5,229	$5,229	5,238	$239	21.8	21.8
Water Subtotal					**$5,229**	**$5,229**	**5,238**	**$239**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption /Costs/Emissions	177,374	$8,019	29.49
Estimated Annual Savings	72,696	$3,431	12.13
Percent Savings	41%	43%	41%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** The cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro's website) and the cost of natural gas is 0.0457 $/kWh (as of November 1, 2005).

Table 8 Water Saving Opportunities for the Community Hall

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	10	$309	$150	$5,233	80%
Install water efficient toilets.	9	$284	$150	$4,453	55%
Install water efficient urinals.	2	$343	$200	$1,238	60%

* The total cost column includes 14% taxes

5.3 GENERAL RECOMMENDATIONS

Lighting

As previously mentioned, when the Community Hall is renovated, the T12 fluorescent lighting in the larger hall will be replaced with energy efficient T5s; therefore, this opportunity is not included in Table 7 above. Aside from these lights, there are 41 – 4' T12 fluorescent lights that could be replaced with T8s to save energy and several incandescent light bulbs. When the incandescent bulbs burn out, replacing them with compact fluorescent bulbs would result in significant energy savings with a short payback period. The exit signs are on 24 hours a day year round. Replacing these exit incandescent lamps with LEDs would reduce their energy consumption by 90%. Table B.4.3 in Appendix B shows the lighting analysis summary for the Community Hall.

Envelope

There are several pedestrian doors to the hall that should be replaced and/or weather-stripped. Weather-stripping and sealing windows and doors eliminates infiltration, resulting in energy savings with a short payback period. The roof of the Community Hall will be upgraded during renovations.

HVAC

The Community Hall is only occupied for 15% of the time. Annual energy savings would result from installing programmable thermostats and setting the temperature back to 15°C (59°F) when the hall is unoccupied. Wiring the thermostat into the light switch would ensure that when the lights are turned off, the temperature setting would be reduced.

The three furnaces in the hall are all standard, 80% efficient furnaces. Replacing these furnaces with premium, 95% efficient furnaces would save 15% in the annual heating costs. The fourth furnace is already a high efficiency furnace.

Water

Water savings for the Community Hall would result from replacing the current sink faucets, toilets, and urinals with water efficient fixtures. Table B.4.5 in Appendix B shows the results from this analysis.

6.0 MUSEUM AND CULTURAL CENTRE

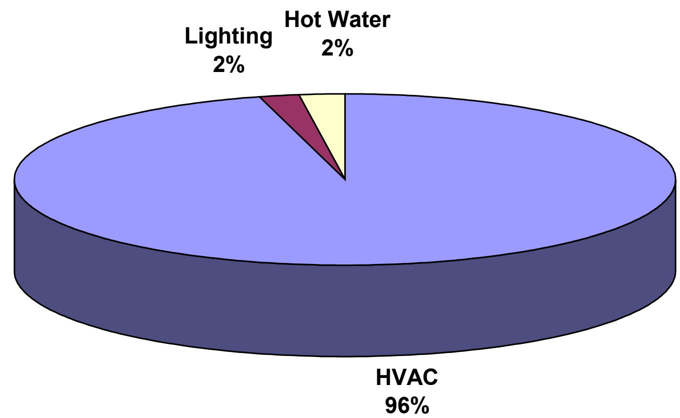
6.1 BACKGROUND

The Museum and Cultural Centre is a two-story, 5,000 square foot building that is approximately 70 years old. The Cultural Centre occupies half of the second floor and the Museum occupies the remaining half of the second floor and the entire main floor. Both the Museum and the Cultural Centre are occupied from Monday to Friday throughout the summer.

Photo 5 – Museum and Cultural Centre

The main floor of this building is heated using an old gas furnace and the second floor is heated electrically with baseboards and one unit heater. The total natural gas and electrical energy consumption in the previous year was 47,340 kWh and 10,870 kWh, respectively. The following pie chart shows the breakdown of energy consumption for the Museum and Cultural Centre.

Energy Breakdown (% of Total kWh) for the Museum and Cultural Centre



There are two washrooms in this building, one on the main floor and one upstairs. All the water fixtures in these washrooms are high flow. The hot water consumed by the water fixtures in the washrooms was calculated by estimating the occupancy of the building and the frequency at which these fixtures are used. A total annual hot water consumption was then established.

6.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 9 and 10 below show summaries of the energy and water saving opportunities for the Museum and Cultural Centre. The following assumptions were made in the calculations:

- The building is occupied Monday to Friday from June to August.
- The outdoor lights are on 12 hours per day year round.
- The temperature is maintained at 21°C (70°F) in the summer and 10°C (50°F) in the winter.

Table 9 Energy Saving Opportunities for the Museum and Cultural Centre

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
When replacing the interior incandescents, replace them with compact fluorescents.	18	$12	$8	$0	$246	$164	583	$35	7.0	4.7
Lighting Subtotal					**$246**	**$164**	**583**	**$35**		
ENVELOPE										
Replace and weatherstrip double wood door.	1	$700	$700	$200	$1,026	$1,026	5,670	$259	4.0	4.0
Replace steel door to second floor.	1	$350	$350	$100	$513	$513	545	$33	15.7	15.7
Replace wood door to second floor storage.	1	$350	$350	$100	$513	$513	506	$30	16.9	16.9
Replace boarded windows.	4	$2,100	$1,800	$400	$2,850	$2,508	4,238	$194	14.7	12.9
Remove window air conditioner in winter.	1	$0	$0	$100	$114	$114	1,026	$62	1.9	1.9
Envelope Subtotal					**$5,016**	**$4,674**	**11,985**	**$578**		
HVAC										
Replace 60% efficient furnaces with 95% efficient furnaces.	1	$2,000	$2,000	$800	$3,192	$3,192	9,368	$428	7.5	7.5
HVAC Subtototal					**$3,192**	**$3,192**	**9,368**	**$428**		
HOT WATER										
Replace hot water heater with instantaneous hot water heater.	1	$300	$300	$900	$1,368	$1,368	698	$32	42.9	42.9
Water Subtotal					**$1,368**	**$1,368**	**698**	**$32**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption /Costs/Emissions	58,210	$3,011	8.8
Estimated Annual Savings	22,623	$1,072	3.66
Percent Savings	39%	36%	42%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** The cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro's website) and the cost of natural gas is 0.0457 $/kWh (as of November 1, 2005).

Table 10 Water Saving Opportunities for the Museum and Cultural Centre

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	2	$309	$150	$1,047	80%
Install water efficient toilets.	2	$284	$150	$990	55%

* The total cost column includes 14% taxes

6.3 GENERAL RECOMMENDATIONS

Lighting

The only practical energy saving opportunity for the Museum and Cultural Centre in terms of lighting is to replace the incandescent light bulbs with compact fluorescents when they burn out. Since the Centre is only occupied for three months of the year, the T12 fluorescent lights are not on enough to make replacing them worthwhile. The lighting analysis summary for this building is shown in Appendix B, Table B.5.3.

Envelope

Several of the doors in the Museum and Cultural Centre have little or no insulation. Replacing and weather-stripping these doors would reduce the annual heating requirements. A significant amount of heat is also being lost through some of the windows. Heat losses through the boarded up windows could be reduced by up to 85% if they were replaced with triple pane windows. The most economical energy saving opportunity is to remove the window air conditioning unit in the winter and close the window; this would eliminate the leakage around the A/C. Further details are shown in Appendix B, Table B.5.4.

HVAC

The furnace used to heat the main floor of the building is old with an efficiency of approximately 60%. Since such a large portion of the annual energy consumption is used for heating the building, significant savings would result from replacing the furnace with a 95% efficient furnace.

Water

The hot water tank loses approximately 1,200 kWh of heat in a typical year. Installing an instantaneous water heater would eliminate these losses.

Table 10 shows the percent water savings that would result from replacing the current high flow water fixtures with water efficient fixtures.

7.0 PUBLIC WASHROOM

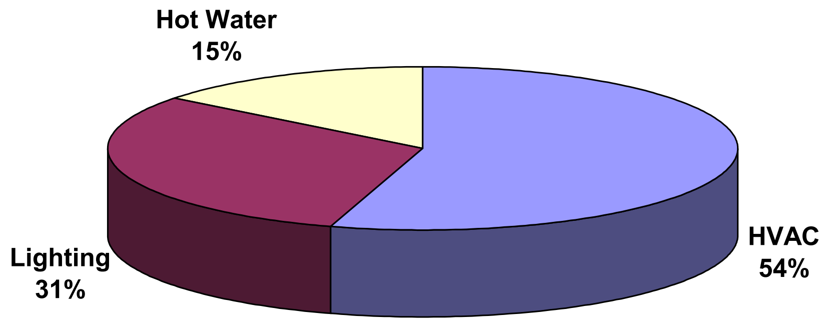
7.1 BACKGROUND

The Public Washroom is a small, 355 square foot building constructed approximately 40 years ago of masonry walls and a flat roof. The washrooms are open 7 days a week year round for 12 hours a day.

Photo 6 – Public Washroom

The washrooms use electricity exclusively with a total consumption of 13,000 kWh for the previous year. This total energy is split between lighting, heating, and water heating as shown in the pie chart below.

Energy Breakdown (% of Total kWh) for the Public Washroom



An individual water well supplies water to both the men's and women's washrooms. There is no water meter at this facility to measure the actual water consumption so the hot water consumption was calculated based on estimations of the frequency at which the fixtures are used.

7.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 11 and 12 show the energy and water saving opportunities for the Public Washrooms. The following assumptions were made in the analysis:

- The Public Washroom is occupied 12 hours a week year round.
- The temperature is maintained at 21°C (70°F) at all times.
- For the purpose of water consumption, the typical occupancy of the washrooms is 2.

Table 11 Energy Saving Opportunities for the Public Washroom

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Retrofit 4' x 2 T12 fluorescents with T8 ballast and tubes and put on timer.	4	$75	$55	$80	$707	$616	1,200	$72	9.8	8.5
Replace interior incandescents with compact fluorescents and put on timer.	4	$35	$30	$33	$308	$285	1,507	$90	3.4	3.2
Replace exterior incandescents with high-pressure sodium lights.	2	$130	$93	$130	$593	$508	263	$16	37.6	32.2
Lighting Subtotal					**$1,607**	**$1,409**	**2,970**	**$178**		
ENVELOPE										
Weatherstrip doors.	2	$15	$15	$50	$148	$148	2,779	$167	0.9	0.9
Envelope Subtotal					**$148**	**$148**	**2,779**	**$167**		
HVAC										
Install programmable thermostat; Setback temp to 15°C (59°F).	1	$300	$300	$300	$684	$684	544	$33	20.9	20.9
Install motorized damper on exhaust.	1	$200	$200	$200	$456	$456	813	$49	9.3	9.3
HVAC Subtototal					**$1,140**	**$1,140**	**1,357**	**$81**		
HOT WATER										
Insulate hot water piping.	1	$50	$50	$50	$114	$114	465	$28	4.1	4.1
Water Subtotal					**$114**	**$114**	**465**	**$28**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption /Costs/Emissions	13,030	$1,091	0.39
Estimated Annual Savings	7,571	$455	0.23
Percent Savings	58%	42%	59%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** The cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro's website).

Table 12 Water Saving Opportunities for the Public Washroom

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient toilets.	4	$284	$150	$1,977	55%

* The total cost column includes 14% taxes

7.3 GENERAL RECOMMENDATIONS

Lighting

Since the interior lights in the Public Washrooms are assumed to be on for 12 hours a day year round, replacing them with high efficiency lights and installing timers would save energy with a short payback period. The lighting analysis summary can be found in Table B.6.3.

Envelope

The building's envelope consists of insulated walls, an insulated roof, and two metal doors. Weather-stripping around the metal doors would eliminate the air leakage and thus reduce heat losses with a short payback period.

HVAC

Installing a programmable thermostat and setting the temperature down to 15°C (59°F) throughout the night and installing motorized dampers in the washroom exhaust ducts would save in heating costs.

Water

Insulating the hot water piping would reduce the heat loss from the piping and reduce the annual energy consumption for water heating.

From Table 12 it can be seen that water savings of 55% would result from installing water efficient toilets in both the men's and women's washrooms.

8.0 FIRE HALL

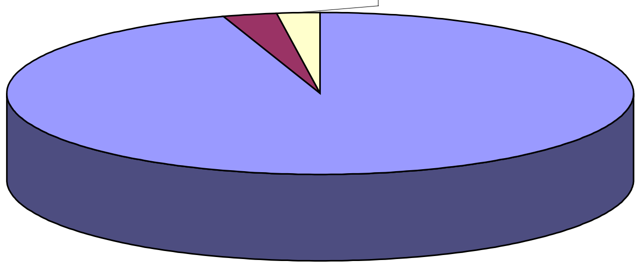
8.1 BACKGROUND

The Fire Hall was built in 1985 of metal framing with a drywall interior and a metal clad exterior. The building consists of a 950 square foot meeting room and a 3,800 square foot fire truck garage. The Fire Hall is occupied intermittently from Monday to Friday.

Photo 7 – Fire Hall

Natural gas is used to heat both the garage and the water and electricity is used for lighting and to heat the meeting room. The total natural gas and electrical energy consumption in the previous year was 68,701 kWh and 19,630 kWh, respectively. The majority of this energy is used for heating, as can be seen in the pie chart below.

Energy Breakdown (% of Total kWh) for the Fire Hall



An individual well supplies water to this building. The water fixtures consist of two toilets, two sinks, one urinal, and two showers. There is no water meter at this facility.

8.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 13 and 14 show the energy and water saving opportunities for the Fire Hall. The following assumptions were made in the analysis:

- The Fire Hall is occupied 4 hours per week year round.
- The outdoor lights are on 12 hours per day year round.
- For the purpose of water consumption, the typical occupancy is 12.
- The temperature of the Fire Hall is maintained at 21°C (70°F).

Table 13 Energy Saving Opportunities for the Fire Hall

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Replace exterior incandescents with high-pressure sodium lights.	4	$130	$93	$130	$1,186	$1,017	1,715	$103	11.5	9.9
Lighting Subtotal					**$1,186**	**$1,017**	**1,715**	**$103**		
ENVELOPE										
Weather-strip and seal pedestrian doors.	1	$15	$15	$50	$74	$74	4,963	$227	0.3	0.3
Weather-strip and seal vehicle doors.	1	$30	$30	$100	$148	$148	10,587	$484	0.3	0.3
Seal windows.	1	$5	$5	$25	$34	$34	741	$34	1.0	1.0
Envelope Subtotal					**$257**	**$257**	**16,291**	**$745**		
HVAC										
Install programmable thermostat; setback temp to 15°C (59°F).	2	$300	$300	$300	$1,368	$1,368	12,484	$570	2.4	2.4
Replace unit heaters with high efficiency furnaces.	2	$2,000	$2,000	$800	$6,384	$6,384	13,434	$614	10.4	10.4
HVAC Subtototal					**$7,752**	**$7,752**	**25,917**	**$1,184**		
HOT WATER										
Replace hot water heater with instantaneous hot water heater.	1	$300	$300	$900	$1,368	$1,368	1,164	$53	25.7	25.7
Insulate hot water piping.	1	$50	$50	$50	$114	$114	465	$21	5.4	5.4
Water Subtotal					**$1,482**	**$1,482**	**1,629**	**$74**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption /Costs/Emissions	88,331	$4,471	12.91
Estimated Annual Savings	45,553	$2,106	7.92
Percent Savings	52%	47%	61%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** The cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro's website) and the cost of natural gas is 0.0457 $/kWh (as of November 1, 2005).

Table 14 Water Saving Opportunities for the Fire Hall

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	2	$309	$150	$1,047	80%
Install water efficient toilets.	2	$284	$150	$990	55%
Install water efficient urinals.	1	$343	$200	$619	60%

* The total cost column includes 14% taxes

8.3 GENERAL RECOMMENDATIONS

Lighting

The only energy saving opportunity in terms of lighting is to replace the exterior incandescent bulbs with high-pressure sodium lights. The interior lights are not used often enough to make replacing them worthwhile. The lighting analysis summary table is shown in Appendix B, Table B.7.3.

Envelope

From Table 13 it can be seen that applying weather-stripping around the vehicle and pedestrian doors would result in large annual energy savings with a short payback period. Similarly, sealing around the window would reduce heat loss.

HVAC

The Fire Hall is only occupied for approximately 2% of the time. Installing a programmable thermostat and setting the temperature back to 15°C (59°F) when the Fire Hall is unoccupied would considerably reduce heating loads.

Another HVAC energy saving opportunity in Table 13 is to replace the unit heaters in the garage with two high efficiency furnaces. This upgrade would save 20% of the current energy used to heat the garage.

Water

The hot water tank and piping are constantly losing heat to the surroundings. Replacing the current hot water heater with an instantaneous water heater and insulating the hot water piping would reduce these losses.

From Table 14 it can be seen that installing water efficient fixtures in the washroom would reduce the water consumed by these fixtures by 55 to 80%. The water usage table for the Fire Hall is Table B.7.5 in Appendix B.

9.0 RECYCLING BUILDING

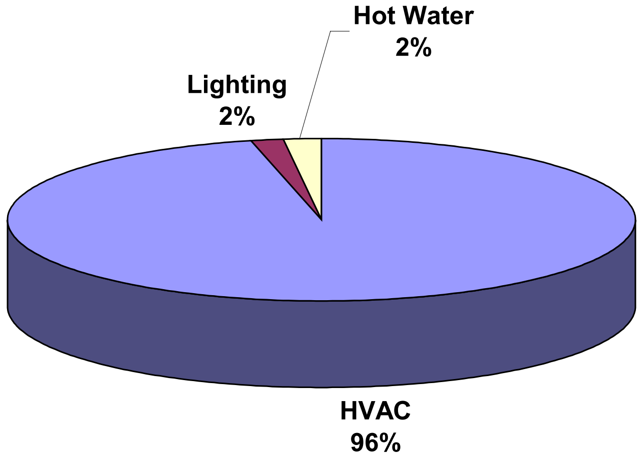
9.1 BACKGROUND

The Recycling Building is a 4,200 square foot building constructed in the 1960s of metal framing and exterior metal cladding. This building is no longer used for recycling but is used for off-season storage of town equipment.

Photo 8 – Recycling Building

The total natural gas and electrical energy consumption in the previous year was 76,433 kWh and 1,690 kWh, respectively. The natural gas is used for heating and the electricity is used for lighting and heating the water. Since there was so little electricity consumed in the previous year, it is safe to assume that this building is rarely used. The total energy breakdown is shown in the pie chart below.

Energy Breakdown (% of Total kWh) for the Recycling Building



An individual water well supplies water to the Recycling Building. There is one washroom with a toilet, a sink, and a shower.

9.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 15 and 16 show a summary of the energy and water saving opportunities for the Recycling Building. The following assumptions were made in the analysis:

- The Recycling Building is occupied for 5 hours a week.
- The temperature is maintained at 5°C (41°F) in the winter.
- For the purpose of water consumption, the typical occupancy is 2.

Table 15 Energy Saving Opportunities for the Recycling Building

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
When replacing interior incandescents, replace them with compact fluorescents.	6	$13	$8	$0	$89	$55	284	$17	5.2	3.2
Lighting Subtotal					**$89**	**$55**	**284**	**$17**		
ENVELOPE										
Replace and weatherstrip vehicle door.	1	$1,000	$1,000	$400	$1,596	$1,596	8,610	$393	4.1	4.1
Replace boarded up doors with insulated wall.	2	$350	$350	$800	$2,622	$2,622	4,509	$206	12.7	12.7
Weatherstrip pedestrian door.	1	$15	$15	$50	$74	$74	1,692	$77	1.0	1.0
Seal windows.	2	$5	$5	$25	$68	$68	496	$23	3.0	3.0
Envelope Subtotal					**$4,361**	**$4,361**	**15,308**	**$700**		
HVAC										
Replace unit heaters with radiant heaters.	2	$1,100	$1,100	$1,000	$4,788	$4,788	11,775	$538	8.9	8.9
HVAC Subtototal					**$4,788**	**$4,788**	**11,775**	**$538**		
HOT WATER										
Insulate hot water piping.	1	$25	$25	$25	$57	$57	233	$14	4.1	4.1
Water Subtotal					**$57**	**$57**	**233**	**$14**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption /Costs/Emissions	78,123	$3,655	13.76
Estimated Annual Savings	27,600	$1,269	4.88
Percent Savings	35%	35%	35%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** The cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro's website) and the cost of natural gas is 0.0457 $/kWh (as of November 1, 2005).

Table 16 Water Saving Opportunities for the Recycling Building

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	1	$309	$150	$523	80%
Install water efficient toilets.	1	$284	$150	$495	55%
Install water efficient showerheads.	1	$21	$50	$81	29%

* The total cost column includes 14% taxes

9.3 GENERAL RECOMMENDATIONS

Lighting

Since the Recycling Building is occupied so infrequently, replacing the T12 fluorescent lighting is not cost effective. The only energy saving opportunity in terms of lighting is to replace the incandescent light bulbs with compact fluorescent bulbs when they burn out.

Envelope

The vehicle door has no insulation and poor weather-stripping. Replacing and weather-stripping around the door would result in large energy savings with a short payback period. Other energy saving opportunities are to weather-strip one of the pedestrian doors, seal the windows, and replace the boarded up pedestrian door with an insulated wall panel.

HVAC

Replacing the unit heaters with radiant heaters would allow the air temperature to be kept approximately 3°C (5°F) cooler while still maintaining everything in the room at the same temperature. This would result in a significant reduction in the annual heating load.

Water

From Table 16 it can be seen that replacing the water fixtures in the washroom with water efficient fixtures would save from 29 to 80% of the current fixtures annual water consumption.

Other Issues

As noted in Section 4, it is worth considering relocating operations from the Town Shop to this building and shutting down the Town Shop.

10.0 CARBERRY PLAINS COMMUNITY CENTRE

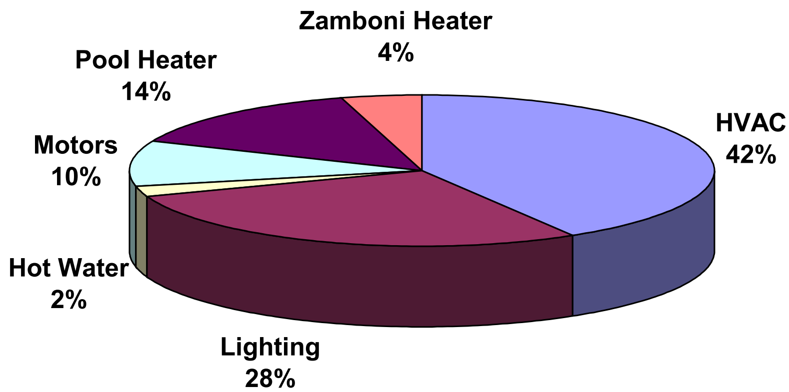
10.1 BACKGROUND

The Carberry Plains Community Centre is a large, 44,000 square foot building that houses a curling rink, a hockey rink, a bowling alley, a rifle range, dressing rooms, lounges, and an outdoor swimming pool. This building is one of the more energy and water efficient buildings in this study. The centre was built in 1971 of metal framing and exterior metal cladding. The insulation in the roof was recently upgraded. Renovations are in progress for an addition to the east side of the hockey rink to house new dressing rooms and a new zamboni room. The hockey rink, curling rink, rifle range, and bowling alley are used throughout the winter (October to April) and the pool is used in the summertime.

Photo 8 – Carberry Plains Community Centre

A geothermal heating system was installed in 1994 to heat a portion of the complex. This geothermal system incorporates a closed system ground loop, heat pumps, and a desuperheater on the rink refrigeration system. The hockey rink, curling rink, and pool dressing rooms are heated with a gas furnace and gas unit heaters. The zamboni room is heated with a hydronic heater off the hot water tank. The total amount of natural gas and electrical energy consumption in the previous year was 687,458 kWh and 464,410 kWh, respectively. The total energy breakdown is shown in the pie chart below.

Energy Breakdown (% of Total kWh) for the Carberry Plains Community Centre



An individual water well supplies water to the Community Centre. In the wintertime, the zamboni consumes the majority of the water to flood the ice. In addition, there are several washrooms throughout the Centre that contribute to the annual water consumption. The washrooms are located in the hockey lounge, curling lounge, basement, and pool dressing rooms and have a mixture of high water use fixtures as well as water efficient fixtures.

10.2 ENERGY AND WATER SAVING OPPORTUNITIES

Tables 17 and 18 show a summary of the energy and water saving opportunities for the Community Centre. The following assumptions were made in the analysis:

- The hockey rink is occupied from October to April for 8 hours a day.
- The curling rink is occupied from October to April for 56 hours per week.
- The bowling alley is occupied from October to April for 42 hours per week.
- The rifle range is occupied from November to April for 4 hours per week.
- The pool is occupied from June to August.
- The temperature of the hockey rink is kept approximately 5°C (9°F) above the outdoor temperature throughout the winter.
- The temperature of the curling rink is kept at 8°C (46°F) throughout the winter.
- All other areas are maintained at 21°C (70°F) throughout the winter.

Table 17 Energy Saving Opportunities for the Carberry Plains Community Centre

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
LIGHTING										
Hockey rink – convert 300W incandescents to metal halides.	12	$150	$50	$100	$3,420	$2,052	4,032	$242	14.1	8.5
Kitchen – retrofit 8’x2 T12 fluorescents with T8 ballasts and tubes.	4	$75	$40	$75	$684	$524	820	$49	13.9	10.7
Curling lounge – retrofit 4’x2 T12 fluorescents with T8 ballasts and tubes.	14	$55	$35	$60	$1,835	$1,516	856	$51	35.7	29.5
Curling rink – convert incandescents to compact fluorescents.	4	$15	$10	$13	$125	$103	452	$27	4.6	3.8
Dressing rooms – retrofit 4’x2 T12 fluorescents with T8 ballasts and tubes.	15	$55	$35	$60	$1,967	$1,625	983	$59	33.3	27.5
Bowling alley – retrofit 8’x1 T12 fluorescents with T8 ballasts and tubes.	8	$65	$35	$65	$1,186	$912	574	$34	34.4	26.5
Install timer on outside pool lights.	1	$40	$40	$100	$160	$160	6,570	$394	0.4	0.4
Parking lot controllers.	2	$100	$75	$150	$570	$513	720	$43	13.2	11.9
Lighting Subtotal					**$9,947**	**$7,404**	**15,006**	**$901**		
ENVELOPE										
Replace wood doors from lounge to hockey rink.	4	$350	$350	$100	$2,052	$2,052	1,036	$62	33.0	33.0
Weather-strip glass doors to lobby.	4	$15	$15	$50	$296	$296	463	$28	10.7	10.7
Weather-strip metal doors to hockey lounge.	2	$15	$15	$50	$148	$148	926	$56	2.7	2.7
Weather-strip pedestrian doors to ice plant.	2	$15	$15	$50	$148	$148	926	$56	2.7	2.7
Weather-strip vehicle door to curling rink.	1	$30	$30	$100	$148	$148	1,824	$83	1.8	1.8
Weather-strip pedestrian door to curling rink.	1	$15	$15	$50	$74	$74	793	$36	2.0	2.0
Weather-strip pedestrian doors to hockey rink.	2	$15	$15	$50	$148	$148	341	$16	9.5	9.5
Replace and seal windows (curling lounge, hockey lounge, entrance lobby).	29	$23,000	$18,000	$3,200	$29,868	$24,168	8,320	$500	59.8	48.4
Upgrade wall insulation on east and west walls of curling rink.	1	$16,500	$16,500	$16,500	$37,620	$37,620	100,603	$6,040	6.2	6.2
Envelope Subtotal					**$70,503**	**$64,803**	**115,233**	**$6,876**		

Description	Qty	Installed Cost/Unit ($)			Total Cost** ($)		Estimated Annual Savings		Simple Payback Years	
		Capital (NI*)	Capital (WI*)	Labour	NI*	WI*	kWh	$***	NI*	WI*
HVAC										
Replace pool dressing room furnace with high efficiency furnace.	1	$2,000	$2,000	$800	$3,192	$3,192	14,250	$651	4.9	4.9
Replace unit heaters in curling rink with high efficiency furnaces.	4	$2,000	$2,000	$800	$12,768	$12,768	32,000	$1,462	8.7	8.7
Install motorized damper on exhaust.	1	$400	$400	$400	$912	$912	1,627	$74	12.3	12.3
Use “Tropical Fish” as a liquid solar pool blanket.	12	$20	$20	$0	$274	$274	66,000	$3,016	0.1	0.1
HVAC Subtotal					**$17,146**	**$17,146**	**113,877**	**$5,204**		
MOTORS										
When replacing 20 HP brine pump motors, replace them with high efficiency motors.	2	$200	$200	$0	$456	$456	945	$57	8.0	8.0
Motor Subtotal					**$456**	**$456**	**945**	**$57**		
HOT WATER										
Insulate hot water piping.	1	$125	$125	$125	$285	$285	1,163	$53	5.4	5.4
Replace sink faucets with water efficient metering faucets.	10	$309	$309	$150	$5,233	$5,233	3,246	$148	35.3	35.3
Replace showerheads with water efficient showerheads.	5	$21	$21	$50	$405	$405	4,290	$196	2.1	2.1
Replace 380 MBH pool heaters with high efficiency pool heaters.	2	$4,914	$4,914	$1,000	$13,484	$13,484	28,566	$1,305	10.3	10.3
Replace zamboni water heater with high efficiency water heater.	1	$6,684	$6,684	$1,000	$8,760	$8,760	7,135	$326	26.9	26.9
Water Subtotal					**$28,166**	**$28,166**	**44,399**	**$2,029**		

TOTALS	Energy (kWh)	Cost ($)	CO_2 (Tonnes)
Existing Annual Consumption /Costs/Emissions	1,151,868	$56,204	137.25
Estimated Annual Savings	289,460	$15,067	32.76
Percent Savings	25%	27%	24%

* NI = Cost does not include incentives, WI = Cost includes incentives
** The total cost column includes 14% taxes.
*** The cost assigned to electricity is 0.06004 $/kWh (rate was taken from Manitoba Hydro’s website) and the cost of natural gas is 0.0457 $/kWh (as of November 1, 2005).

Table 18 Water Saving Opportunities for the Carberry Plains Community Centre

Description	Qty	Installed Cost/Unit ($)		Total Cost* ($)	Annual Water Savings (%)
		Capital	Labour		
Install water efficient metering faucets.	10	$309	$150	$5,233	80%
Install water efficient toilets.	14	$284	$150	$6,927	55%
Install water efficient showerheads.	5	$21	$50	$405	29%
Install water efficient urinals.	2	$344	$200	$1,240	60%

* The total cost column includes 14% taxes

10.3 GENERAL RECOMMENDATIONS

Lighting

Replacing the incandescent light bulbs in the hockey rink with metal halides would result in significant energy savings. The T12 fluorescent lights in the kitchen, curling lounge, dressing rooms, and bowling alley could also be replaced with T8 ballasts and tubes to save energy; however, the payback period is long for some of these opportunities. The best opportunity for energy savings in terms of lighting is to install timers on the outdoor pool lights. This would reduce the electricity consumption of these lights by 50%.

Envelope

Heat loss through the cracks around the windows and doors would be reduced if new weather-stripping and sealant were applied. Replacing the windows in the curling lounge, hockey lounge, and entrance lobby would save energy, but with a long payback period.

The largest energy saving opportunity presented in Table 17 is in upgrading the insulation in the east and west walls of the Curling Rink from R-2 to R-20 (south wall is already R-20). Although this upgrade has a high installation cost, the annual energy savings are substantial.

Since the hockey rink is kept cold throughout the winter, upgrading this insulation would not result in significant energy savings.

HVAC

Since the majority of the Centre is heated using an energy efficient geothermal heating system, the only saving opportunities with heating is in the gas appliances. The gas furnace in the pool dressing room is only 80% efficient. Replacing this with a high efficiency furnace would save 15% of the annual heating requirements for the dressing rooms. Similarly, replacing the unit heaters in the curling rink with high efficiency furnaces would save 20% of the energy required to heat the rink.

Installing a motorized damper on the kitchen exhaust and keeping this damper closed when ventilation is not required would eliminate unnecessary heat losses.

The outdoor swimming pool loses a large amount of heat through evaporation from the surface of the pool. An option for energy savings is to use “Tropical Fish”, which are an alternative to conventional solar blankets, to reduce heat losses. The fish contain a liquid called Heatsavr, which is a mixture of ingredients that are lighter than water and thus float to the surface. The liquid forms a perfectly thin layer over the pool surface, which reduces heat losses by almost 40%.

Motors

When replacing the 20 HP brine pump motors in the ice plant, consideration should be given to installing premium efficiency versus standard efficiency motors. The energy savings and the cost difference associated with this opportunity is shown in Table 17.

Water

Since the pool boilers consume such a large portion of the total annual energy consumption, there is a large potential for savings in replacing them with high efficiency boilers.

Replacing the zamboni water heater with a high efficiency water heater would reduce the annual energy consumption.

Replacing the high flow washroom fixtures with water efficient fixtures would significantly reduce both the hot and cold water consumption (Table 18).

Future Renovations

During the site tour, upcoming building renovation projects were discussed town officials. One project that is currently out for tender is the 6,400 square foot building addition plan to add dressing rooms to the Carberry Plains Community Centre. The building addition, to be constructed on the east end of the building, includes:

- 4 new dressing rooms and a referee's room;
- washroom and office;
- mechanical room and new zamboni room.

The drawings for the addition were reviewed to ensure that good energy saving features were incorporated in the design. The following summarizes the energy saving features included in this design:

- Walls and roof insulated to today's standards (R20 and R40 Respectively);
- In-floor hydronic heating system with a total of 7 heating zones;
- Ventilation system incorporating a heat recovery ventilator.

The existing geothermal heating system was assessed to establish if it could be extended to include the new addition. Unfortunately, it was established that this system did not have the capacity necessary to accommodate the addition.

11.0 GENERAL UPGRADES AND MAINTENANCE RECOMMENDATIONS FOR REDUCING ENERGY AND WATER CONSUMPTION

The following energy and water saving opportunities exist in many buildings including those toured in this study. The saving opportunities are generic in nature and include both capital upgrades (Sections 11.1 – 11.4) and maintenance activities (Section 11.5) that will result in energy/water savings for all the buildings.

11.1 LIGHTING AND ELECTRICAL

Light Switches – Place signs or stickers adjacent to switches to remind occupants to shut off switches when leaving rooms unoccupied. Occupancy sensors can be provided to shut off lights automatically when not in use. Timers can also be used in a similar fashion.

Fluorescent Lighting Systems – T12 lights should be upgraded to premium T8 or T5 electronic ballasts and lamps. This may be done when current T12 ballasts need replacement or in a planned retrofit program. Use cold-weather rated ballasts for retrofits in areas where the temperature is below 15°C (59°F). When selecting T8 electronic ballasts, please refer to Manitoba Hydro's Power Smart Lighting program for current listings of eligible ballasts. Contact Manitoba Hydro for details.

EXIT Signs – Replace all incandescent exit signs with 3W LED signs.

Incandescent Bulbs – All incandescent bulbs should be converted to compact fluorescents. Compact fluorescent bulbs last approximately 10 times longer than incandescents and save up to 75% of the energy costs.

Exterior Lights – Compact fluorescent bulbs do not function at low temperatures, therefore, the exterior lights should be replaced with high-pressure sodium lighting. High-pressure sodium lights are the most energy efficient type of lighting available today. Savings of approximately 50% would result from replacing exterior incandescent fixtures with these high-pressure sodium lights. Photos cells should be considered for automatically shutting off outdoor lights during day light conditions.

Parking Lot Controllers – Parking lot controllers save energy by automatically adjusting the power at the car plugs depending on the outside temperature.

Other Recommendations - Dispose of all fluorescent lamps and ballasts through a recycling company to reduce toxins entering the landfills.

Refer to Appendix D for a list of Manitoba Hydro's Power Smart incentives and listings of other incentive programs.

11.2 BUILDING ENVELOPE

Window/Door Infiltration – Seal drafts on windows and doors. This can be done by installing or upgrading weather-stripping, or with removable silicone caulking such as “Draft Stop” or “Peel and Seal”.

Window/Door Replacement – Windows and doors with low R-values should be considered for replacement. Manitoba Hydro offers incentives for new windows.

Wall / Roof Insulation – The wall insulation on older buildings typically has a resistance of R-12 or less. Large energy savings would result from upgrading this insulation to R-20. Similarly, roof insulation should be upgraded to R40. In addition to the energy savings, upgrading insulation also extends the life of a building by avoiding the rotting of wood framing from the development of mould and mildew in the walls.

Electrical Outlets – Install draft-reducing foam pads in all electrical receptacles

11.3 HEATING, VENTILATION, AND AIR CONDITIONING

Temperature Control – Use programmable electronic thermostats where appropriate. Use the recommended “set-back” and “set forward” temperatures during unoccupied periods. A 3°C “set-back” over a 12 hour period can reduce heating costs by 4%. Terminate ventilation during un-occupied periods.

Air Conditioning – Reduce the cooling load on the air conditioner by keeping the facility a few degrees warmer and using fans at workstations to augment cooling of personnel. Provide an economizer to supply “free cooling” when it is cool outside and air conditioning is required.

Remove or insulate wall or window-mounted air conditioners for the winter season.

HVAC Ductwork – Seal duct joints with duct tape to reduce losses of heated or cooled air where the ducts traverse cold or hot areas respectively. Insulate duct work passing through unconditioned spaces.

Thermostat Equipped Electric Baseboard Heaters – Mark the thermostat “normal” setting to provide a visual cue as to when they are on or set too high.

11.4 WATER CONSUMPTION

Excessive water usage wastes energy, increases water / sewage treatment costs and further risks damage to the environment.

Toilet Tanks – Install flush volume reduction devices in existing toilet tanks to reduce the quantity of water used per flush by about 25%. "Early closing flapper valves" are inexpensive and are easily installed**.**

Toilets – When replacing older toilets or installing new ones, use high efficiency, low-flush volume models that require only 6 L (1.3 Imp. gal.) per flush. Refer to the toilet and drainline reports on the Canadian Water and Wastewater Association (CWWA) website for advice in selecting a toilet that will perform well.

Hot Water – In facilities where large volumes of hot water are not required, set the hot water tank thermostat to 55°C (131°F). A reduction from 60°C to the recommended value of 55°C saves approximately 3% of the energy related to hot water generation. Insulate the first 2 meters (6 ft) of the cold water line and as much of the hot water distribution lines as practical, particularly where hot water lines traverse cold spaces.

Shower Controls – In facilities where large amounts of water are used, consider retrofitting single actuator, short cycle (adjustable), self-closing control valves, with pressure-balancing temperature controls to reduce water consumption. These controls limit flow and allow for a preset water temperature (recommended 40°C) for the showers in order to reduce water heating costs and wastage of water.

Auto-Shut Off Fixtures - Consider using spring loaded fixtures that automatically shut off water flow in public areas.

Tankless Water Heaters – Consider replacing the hot water storage tanks with instantaneous water heaters to avoid storage tank losses and save energy.

11.5 MAINTENANCE

Maintenance activities are important to ensure that the equipment in a building is operating efficiently and to reduce the potential for future equipment breakdown. One option is to hire a maintenance contractor to perform inspections four times annually to clean, lubricate, test, and adjust the building's HVAC.

The following is a list of HVAC maintenance procedures that should be performed two to four times annually:

Heating/Ventilation Systems

- Change filters
- Inspect belts
- Inspect and clean heating coils
- Inspect operation of blower

- Inspect and lubricate motor and fan bearings
- Inspect and lubricate fresh air, exhaust air, and return air dampers

Air Conditioning/Ice Plant Systems

- Clean outdoor condensers
- Clean filters
- Check refrigerant and oil levels
- Inspect ice plant and refrigerant piping for leaks
- Inspect and lubricate brine pumps
- Inspect and lubricate motorized and back draft dampers
- Inspect A/C operation and adjust as required

12.0 IMPLEMENTATION OF ENERGY AND WATER SAVING OPPORTUNITIES

12.1 IMPLEMENTATION

The energy and water saving opportunities suggested in this report range from simply changing a light bulb to installing a geothermal heating system. Some of the simpler recommended upgrades can be completed in-house while others would require hiring a contractor to complete the work. Major renovation projects will require a consulting engineer to design and help implement the upgrade. The various energy/water saving opportunities discussed throughout this report are separated into three levels of implementation: (1) in-house implementations, (2) contractor implementations, and (3) consulting engineer implementations. The following sections discuss which upgrades fall into each of these three categories.

In-House Implementations

Some of the energy saving opportunities can be completed in-house. Replacing the incandescent light bulbs with compact fluorescent bulbs involves simply replacing the bulb and could easily be done by one of the building's janitors. Installing weather-stripping around the doors and sealing the windows could also be done in-house. For the saving opportunities that involve replacing the doors, some could be done in-house while for others, such as the vehicle doors, it is best to hire a contractor.

Contractor Implementations

The majority of the energy saving opportunities will require a contractor. In terms of lighting, replacing the T12s with T8s requires replacing the ballast as well as the bulbs. An electrician should be hired to complete this function. Replacing the exterior incandescent lights with high-pressure sodium lights and replacing the exit incandescent lamps with LED modules involve replacing the fixture and will therefore require an electrician.

Upgrades on a building's envelope not mentioned in the "In-House Implementations" section should be done by a contractor. This includes replacing windows and vehicle doors, and upgrading the wall and/or roof insulation.

In terms of HVAC, a contractor should be hired to install programmable thermostats, motorized dampers, heating recovery ventilators (HRVs), new furnaces, and new air conditioner units.

Electricians should be hired to replace motors with high-efficiency motors.

For the water saving opportunities involving installing low-flow water fixtures, a contractor will likely be required. Insulating the hot water tank, and installing an instantaneous water heater will also require a contractor.

Consulting Engineer Implementations

The only energy saving opportunity for the Town of Carberry that requires a consultant to implement is the geothermal heating system for the Office Building. This will require a detailed site investigation, bore hole testing, and energy modeling of the building to property size the geothermal system.

Consulting services should be considered for any major upgrades to buildings and services.

12.2 FINANCING

There are several incentive programs listed in Appendix D of this report that will help finance the implementation of the energy and water saving opportunities. In the "Energy Saving Opportunity" tables throughout this report, the capital costs are listed both with and without incentives. The incentives in these tables are from Manitoba Hydro's Power Smart Incentives and apply to energy efficient lighting and windows, wall insulation upgrades, and geothermal heating systems. For more information on these incentives, contact your local Manitoba Hydro Energy Services Coordinator or the contact listed in Table D.1.

Table D.2 lists other incentive programs that are available for energy saving upgrades. These programs are:

- Energy Innovators Initiative: Energy Retrofit Assistance (ERA)
- Municipal Rural Infrastructure Fund (MRIF)
- Renewable Energy Development Initiative (REDI)
- Community Places Program
- Sustainable Development Innovations Fund (SDIF)

For further information on these programs refer to the website listed in the table.

Members of the Association of Manitoba Municipalities also have the option of purchasing products and services in bulk at reduced prices through the Municipalities Trading Company of Manitoba Ltd. (MTCML). Details on this can be found in Appendix G of this report.

12.3 POLITICAL FRAMEWORK

General Municipal Environment in Manitoba

In Manitoba, municipal elections are set every 4 years. The next municipal election will be in October 2006, which may mean that some councils will see a change in members. However, we do not expect this to have a major impact on the plans to implement the recommendations of this report.

There are currently no Provincial or Federal targets or goals set that municipalities must achieve. ‘Green Projects’ have become common in Manitoba and often programs like the Municipal Rural Infrastructure Fund (MRIF) targets such projects. Details of this project are included in Appendix D of this report. Manitoba has been a leader in energy efficiency and many municipalities have partnered with other levels of government and companies like Manitoba Hydro on innovative projects. We believe the MMEP project is an excellent example of an innovative project and believe all of the participating communities are receptive to innovative ideas because they have agreed to participate.

A recent trend in municipal government has been toward longer-term planning. This is seen with the recent changes to the provincial Planning Act and the requirements for community sustainability plans in the New Deal agreement. The recommendations in this report certainly complement this direction.

Political Environment in Carberry

Up until now there have been no energy or water efficiency audits done in this Town. However, there have been some energy efficient upgrades made to the Carberry Plains Community Centre. Included in these upgrades were the following:

- T8 Fluorescent lights in the hockey lounge.
- Energy efficient LED exit signs.
- Upgrades to the roof insulation.
- Installation of a geothermal heating system.

The Chief Administrative Officer (CAO) for the Town of Carberry is also the CAO for North Cypress. The knowledge gained from this energy and water efficiency study will therefore be shared among both municipalities.

13.0 PERFORMANCE VERIFICATION

Following the implementation of the recommended energy and water saving opportunities, it is important to continuously monitor the annual energy consumption to keep a record of the resulting energy savings.

Appendix F contains a spreadsheet and graph for each of the buildings audited. These spreadsheets should be used as a tool to monitor the energy consumption on a monthly basis. The first five columns in each spreadsheet are for year 2004-2005 and have already been completed.

Following the implementation of the measures discussed in this report, the energy consumption should be recorded. The year headings may need to be re-entered, depending on when the implementations are completed. The monthly electrical energy consumption in kWh taken from the building's electricity bill should be recorded in the "Billed Elec. Energy" column and the monthly gas consumption in m^3 should be recorded in the "Billed Natural Gas" column. The monthly energy consumption for heating depends on the outdoor temperatures for that month. The "Billed Energy Consumption" is therefore normalized to the year 2004-2005 such that a fair comparison can be made.

The normalized energy consumption is determined as follows:

$$NEC = TEC \times (\%\ Energy\ Used\ for\ Heating) \times \left(\frac{HDD(present)}{HDD(2004-2005)} \right) + TEC \times (1 - \%\ Energy\ Used\ for\ Heating)$$

Where *NEC* is the Energy Normalized to year 2004-2005, *TEC* is the total energy consumption and *HDD* is the heating degree-days.

The heating degree-days (HDD) for a given day are the number of Celsius degrees that the mean temperature is below 18°C. This data can be found for Brandon on the following website:

http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=CA&StationID=3471&Year=2005&Month=11&Day=15

Once the "Billed Elec Energy", the "Billed Natural Gas", and "HDD" columns are filled in, the "Energy Normalized to 2004-2005" column is automatically calculated and the graph is updated. From this graph, the energy consumption can be monitored on a monthly basis to ensure that the upgrades are resulting in a reduction in energy consumption.

APPENDIX A

INVENTORY SHEETS

TABLE OF CONTENTS – APPENDIX A

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Carberry	**Date:** Sept. 29, 2005
Toured By: Ray Bodnar, Brent McMillan	**Construction Date:** approx. 1990
Building: Office Building	**Renovations:** Minor interior renovations 3 years ago. None to effect energy efficiency.
Address: 316-4th Avenue	
L x W x H: 28m x 12m x 3m h — **Area:** 336 sm	
Building Capacity: 8	
Building Floor Plan: Offices	**Occupied Times:** Monday to Friday; 8:30 AM to 4:30 PM

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: Concrete block on exterior on east, stucco on other walls. Walls are 6" thick, assume R20.
Roof Type/R-value: Sloped roof with shingles, drywall exterior, Assume R40.
Door Type/weather stripping: 2- ped. Doors: 1 glass and 1 insulated steel. Stripping good (8/10). Front door closer stays open way too long, adjust.
Window type/caulking: 3 – 1.8m x 1.8 min front; 7 – of the same on the west side. Double pane, metal frame, Caulking can be improved (6/10)
Other:
MECHANICAL
Heating System: 2 – gas furnaces, 80% efficient, Luxaire with humidifier and 10" intake to outside.
Cooling System: 2 - High efficiency Armstrong condensers.
Ventilation System: 2 washroom exhaust fans on light switch. (Broan)
HVAC Controls: 2 standard heat/cool thermostats, no setback.
HVAC Maintenance/Training:
Water Supply System: Well inside building.
Domestic Hot Water System: 1 small electric water heater in ceiling space, say 10 gal.
Water Fixtures: 2 toilets (13 lpf), 2 sinks high flow.

ELECTRICAL
Indoor Lighting: T12's: 2 x 4' lamps = 2 (34W);   T12's: 4 x 4' lamps = 49; 2 incandescent in mech room
Outdoor Lighting: 2 in back on photo cell, 1 incandescent in front.
Exit Signs: 3 incandescent.
Motors:
Parking Lot Plugs: 3 in back not on timer.
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro and gas.
NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Carberry		**Date:** Sept. 29, 2005
Toured By: Ray Bodnar		**Construction Date:** 1907
Building: Old Office Building		**Renovations:** Renovations approx. 30 yrs ago. Likely a heritage building.
Address: 122 Main Street		
L x W x H: 16m x 12 x 5.4m h 1 story with basement	**Area:** 192 sm/floor	
Building Capacity: 7		
Building Floor Plan: Offices on main floor, meeting room in basement. Note that the main floor is 3.6 m high and the basement is 1.8 m above grade.		**Occupied Times:** Office open Monday to Friday; 8:30 AM to 4:30 PM, basement used 4 hrs/week.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: Masonry construction with wood paneling inside. Likely upgraded insulation, assume R12.
Roof Type/R-value: Flat roof.
Door Type/weather stripping: single glass door with window in front to be re-caulked and stripped. Metal door in back – re-caulk and strip 6/10. 1 old wood door to basement, no stripping – replace door. 4' wood access hatch to basement – replace.
Window type/caulking: Windows replaced in 1981, 2-pane aluminum sliders, inefficient all with poor caulking. Front (west): 2 – 7' x 4.5'; North: 4 – 75" x 30" ; South: 4 same as front; East: 3 same as front. 6 – 35" x 51" plus 2 – 30" x 30". 1 broken 35" x 51" in the west. Replace all windows.
Other:
MECHANICAL
Heating System: 2 old gas furnaces 30 yrs old, 160/130 MBH; one for main floor, one for basement.
Cooling System: 1 standard A/C for main floor.
Ventilation System: 1 – 6" air intake tied into 1 furnace. Washroom exhaust in main floor only.
HVAC Controls: standard heating stat for basement furnace, setback stat for main floor furnace.
HVAC Maintenance/Training:
Water Supply System: Well pump.
Domestic Hot Water System: 1 – 40 gal gas old water heater 36,000 BTUH input. No insulation on piping.
Water Fixtures: 4 toilets , 4 sinks, 1 urinal, all high flow.

ELECTRICAL
Indoor Lighting: Main floor: 33- T12 4' x 2 - 40 W plus 3 – 100 W incandescent; Basement: 8- T12 4' x 2 & 5-T12 – 4" x 4 plus 9 - 100 W incandescent.
Outdoor Lighting: 3 incandescent 60 W
Exit Signs: 4 incandescent.
Motors:
Parking Lot Plugs: 3
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro and gas.
NOTES
No ventilation to basement.

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Carberry		**Date:** Sept. 29, 2005
Toured By: Ray Bodnar, Frant Aarts		**Construction Date:** approx. 1970
Building: Town Shop		**Renovations:** Building addition A added in 1970 to a very old building (B,C,D) likely 60 years old. 18" of Insulation added in attic of A. See my sketch.
Address: 615-4th Avenue		
L x W x H: 36m x 12m x 4.8m h	**Area:** 432 sm	
Building Capacity: 3		
Building Floor Plan: Workshop, Pump Room and 2 Vehicle Storage rooms; 4 separate rooms. See A,B,C & D on sketch.		**Occupied Times:** Generally open Monday to Friday; 8:30 AM to 4:30 PM, intermittent use for servicing equipment.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: A: wood frame with stucco and wood inner liner, 6" thick, no insulation. B,C,D: masonry with stucco, no insulation.
Roof Type/R-value: Sloped roof with shingles, drywall exterior, Assume R40 in A only. R5 in B,C,D.
Door Type/weather stripping: 1- ped. door: old wood. Stripping poor (3/10) replace. One new ped door on the north wall, replace stripping (6/10). 2 – 12' x 14' new insulated vehicle doors, good stripping. 1 – non-insulated vehicle door, poor stripping – replace door.
Window type/caulking: 4 – 1.5m x 1.0 m single pane, wood frame, Poor caulking can be improved (3/10). Replace
Other:
MECHANICAL
Heating System: A: 2- old Olsen gas unit heaters 130/104 MBH. C: 1 – old Hastings unit heater 80 MBH output Note gas unit heaters have been condemned in B and D but they heat these rooms using existing unit heaters in other rooms and leaving the door open. Assume room temperature is 70F in A and 50 F in B,C,D.
Cooling System: None
Ventilation System: None. A has 2 ceiling fans.
HVAC Controls: standard heating stats.
HVAC Maintenance/Training:
Water Supply System: Well inside building
Domestic Hot Water System: 1 - 30 gal copper electric water heater. Poor insulation on tank, none on piping.
Water Fixtures: 1 toilets , 1 sink high flow.

ELECTRICAL
Indoor Lighting: A: 6-8' T12 x 2; 2 incandescent, 100 W. B: 1-4' T12 x 2; C: 1 100W incandescent; D: 5 – 100W incandescent.
Outdoor Lighting: 1 incandescent 100W
Exit Signs: None
Motors:
Parking Lot Plugs: 1 not on timer.
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro and gas.
NOTES

BUILDING INSPECTION INVENTORY

Revision 2

Municipality: Carberry		**Date:** Sept. 30, 2005
Toured By: Ray Bodnar, Robert Ohrling		**Construction Date:** 1961
Building: Community Hall		**Renovations:** Recent roof calapse in large hall is having the roof replaced. The renovations include new insulation and energy efficient lighting (T5's)
Address: 224 2nd Avenue		
L x W x H: small hall: 27.7m x 9.1m x 3m h. large hall: 36.9m x 15.5m x 5.5m h	**Area:** 824 SM	
Building Capacity: approx. 400		
Building Floor Plan: Small hall with low ceiling adjacent and open to large hall with high ceiling, kitchen.		**Occupied Times:** 3 times per week for 8 hrs at a time.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: Wood frame 2 x 6 with batt insulation, wood paneling inside, vinyl siding outside.
Roof Type/R-value: Sloped metal roof.
Door Type/weather stripping: 8 ped doors, no caulking, poor stripping (6/10) 1 – old wood double door and 1 single door on the east wall to be replaced.
Window type/caulking: new 3 pane 30" x 30" in kitchen. Caulking required.
Other:
MECHANICAL
Heating System: Lennox electric furnace (2003) c/w standard A/C. 2 old gas furnaces in crawlspace80/64 MBH; 1 150 MBH gas furnace in basement (80%); 1 gas furnace under stage high efficiency.
Cooling System: 4 – condensers outside: 2-5 ton, 1 – 3ton, 1 – 4 ton standard efficiency
Ventilation System: 2 wall exhaust fans, no motorized dampers. Minimal air intakes.
HVAC Controls: Old wall stats.
HVAC Maintenance/Training:
Water Supply System: 3 Well pumps: ½ HP
Domestic Hot Water System: 1 – 40 gal electric water heater 3 kW under stage; . 2 – 40,33 gal gas water heaters in basement., 36,40 MBH. No insulation on piping.
Water Fixtures: 9 toilets , 10 sinks, 2 urinals all high flow.

ELECTRICAL
Indoor Lighting: New T5 lights being installed in large hall. This will be 19 – T5 4 x 4’ lamps. The rest of the hall has 41 – T12 4’ x 2 (40W) plus 8 – 100 W incandescent.
Outdoor Lighting: 6 incandescent 100 W.
Exit Signs: 8 incandescent.
Motors:
Parking Lot Plugs: None
OTHER BUILDING SYSTEMS
Ceiling fans going into the hall.
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro and gas.
NOTES
There is a general lack of ventilation in the hall. Consideration should be given to providing economizers for the furnaces.

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Carberry		**Date:** Sept. 30, 2005
Toured By: Ray Bodnar		**Construction Date:** Approx. 70 years old.
Building: Museum and Cultural Centre		**Renovations:** Museum and Cultural Centre renovated inside with possibly new insulation behind drywall on walls and ceiling. Part of second floor is storage and not heated. An unheated enclosed staircase was added to the west side to access the Cultural Centre.
Address: 520 4th Avenue		
L x W x H: 20m x 12m x 7m h, 2 story	**Area:** 240 SM/floor x 2	
Building Capacity: approx. 5 for museum, 10 for cultural centre upstairs.		
Building Floor Plan: Cultural Centre takes up ½ of the second floor, museum takes up the rest.		**Occupied Times:** Museum: 1PM to 6PM June to August. Cultural Centre:??

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: Brick and stucco exterior with wood frame 2 x 6 with batt insulation likely inside walls and ceiling behind drywall in heated areas.
Roof Type/R-value: Flat wood frame roof.
Door Type/weather stripping: Old uninsulated wood double door in front with no stripping and caulking to be replaced. Old un insulated single steel door to second floor inside vestibule to be replaced. No infiltration loss on this one as it is inside the vestibule. Old wood door to second floor storage from unheated storage to be replaced with insulated door.
Window type/caulking: Main Floor: old single pane decorative windows 2 – 44” x 64” plus 4 – 24” x 56” single pane boarded up. Second floor: 28” x 51” 2 pane, 1992, 3 – 42” x 44” 2 pane plus one 30” x 37” 2 pane window with a window A/C (leakage around A/C)
Other:
MECHANICAL
Heating System: 1 old gas furnace approx 100 MBH (70% efficiency) for museum main floor. 3 electric baseboards for Cultural Centre second floor c/w 2 stats. One electric unit heater for second floor storage.
Cooling System: Window A/C for Cultural Centre.
Ventilation System: Kiln exhaust hood and fan approx. 200 cfm
HVAC Controls: Old wall stats.
HVAC Maintenance/Training:
Water Supply System:
Domestic Hot Water System: 1 – 24 gal 32,400 gas water heater; No insulation on piping.

Water Fixtures: 2nd floor: 1 sink and toilet; Main floor: 1 sink and toilet, all high flow.
ELECTRICAL
Indoor Lighting: Museum: 13 INCANDESENT; Second Floor: 3 – 8' x 2 T12 (60W) plus 5 incandescent.
Outdoor Lighting:
Exit Signs: 1 neon type good.
Motors:
Parking Lot Plugs: None
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro and gas.
NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Carberry	**Date:** Sept. 29, 2005
Toured By: Ray Bodnar	**Construction Date:** approx 40 years old
Building: Rest Room Building	**Renovations:** None
Address: 113 Main Street	
L x W x H: 6m x 5.5 x 3.6m h — **Area:** 33 sm/floor	
Building Capacity: 2	
Building Floor Plan: Men's and women's washroom with mechanical room.	**Occupied Times:** 8:00 AM to 8:00 PM, 7 days/week.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: Masonry construction with drywall inside, assume R12.
Roof Type/R-value: Sloped with shingles, drywall inside, assume R20.
Door Type/weather stripping: 2 – metal doors need stripping and caulking.
Window type/caulking: None
Other:
MECHANICAL
Heating System: Electric force flows.
Cooling System: None
Ventilation System: Washroom exhaust no motorized damper.
HVAC Controls: Integral stats for 2 force flows.
HVAC Maintenance/Training:
Water Supply System: Well pump ¾ HP
Domestic Hot Water System: 1 – 40 gal electric old water heater 3 kW. No insulation on piping.
Water Fixtures: 4 toilets , 2 sinks, 1 urinal (3.8 L/flush), all high flow but with auto shutoff taps.

ELECTRICAL
Indoor Lighting: Men’s: 2- T12 4’ x 2 – 34 W plus 2 – 100 W incandescent; Women’s: assume same as men’s.
Outdoor Lighting: 2 incandescent 60 W
Exit Signs: None
Motors:
Parking Lot Plugs: None
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro.
NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Carberry		**Date:** Sept. 29, 2005
Toured By: Ray Bodnar		**Construction Date:** approx. 1985
Building: Fire Hall		**Renovations:** None
Address: 515-4th Avenue		
L x W x H: 38m x 11.6 x 4.2m h (meeting room is 11.6 m x 7.6 m)	**Area:** 440 sm	
Building Capacity: 12		
Building Floor Plan:		**Occupied Times:** Generally open Monday to Friday; 8:30 AM to 4:30 PM, intermittent use 4 hrs/week.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: Metal frame with drywall interior and metal liner exterior, 6" thick, R20.
Roof Type/R-value: Sloped metal roof with T-bar or drywall inside, Assume R30
Door Type/weather stripping: 3- ped. doors: metal. Strip one door, others are good. 2 – 6.1m x 3.6m insulated vehicle doors, stripping is 6/10. Re-do stripping and caulk frames.
Window type/caulking: 2 – 1.1m x 0.6 m triple pane sliders, Poor caulking can be improved (5/10).
Other:
MECHANICAL
Heating System: 2 electric baseboards in meeting room, 2 gas unit heaters in garage 200/154 MBH
Cooling System: None
Ventilation System: Exhaust Fan in meeting room, ceiling fans in garage.
HVAC Controls: standard heating stats for unit heaters (2); 2 standard stats for baseboards.
HVAC Maintenance/Training:
Water Supply System: Well inside blding
Domestic Hot Water System: 1 - 40 gal gas water heater 36,000 BTUH input. No insulation on piping.
Water Fixtures: Washer and dryer, 2 toilets, 2 sinks, 1 urinal, all high flow. 2 low flow showers.

ELECTRICAL
Indoor Lighting: Meeting room: 13- T12 4' x 2 - 40 W; Garage: 9- T12 8' x 2
Outdoor Lighting: 4 fixtures
Exit Signs: None
Motors:
Parking Lot Plugs: None
OTHER BUILDING SYSTEMS
Ceiling fans in garage
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro and gas.
NOTES

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Carberry	**Date:** Sept. 29, 2005
Toured By: Ray Bodnar	**Construction Date:** approx 40 years old
Building: Recycling Depot	**Renovations:** None
Address: NE1 16 27 W 260 C	
L x W x H: 30.5m x 12.8m x 4.6m h — **Area:** 390 SM	
Building Capacity: 4	
Building Floor Plan: Vehicle storage and office.	**Occupied Times:** Intermittent. Used for vehicle storage. Temperature kept at 40F??

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: Metal frame with metal exterior liner, exposed insulation inside, assume R20. Note interior insulation damaged in several places.
Roof Type/R-value: Same as walls.
Door Type/weather stripping: 1 – vehicle door 14' x 13' high, no insulation, no caulking, poor stripping (3/10) 3 – metal doors poor stripping and caulking, 2 doors boarded up – replace with insulated wall.
Window type/caulking: 2 – 44" x 44", 2 pane, poor caulking.
Other:
MECHANICAL
Heating System: Gas unit heaters 25 years old: 2 Clare 80 MBH and 1 Reznor 120 MBH.
Cooling System: None
Ventilation System: None
HVAC Controls: Old wall stats.
HVAC Maintenance/Training:
Water Supply System: Well pump ½ HP
Domestic Hot Water System: 1 – 40 gal electric water heater 3 kW. No insulation on piping.
Water Fixtures: 1 toilet , 1 sink, 1 shower all high flow.

ELECTRICAL
Indoor Lighting: 13- T12 8' x 2 – (F96T12) plus 7 large fixtures in vehicle storage.
Outdoor Lighting: 3 incandescent 100 W, 2 other type.
Exit Signs: None
Motors:
Parking Lot Plugs: None
OTHER BUILDING SYSTEMS
PROCESS SYSTEMS
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro and gas.
NOTES
A metal liner should be added to protect the exposed insulation in the building. Consider re-locating Town Shop operations to this building and close down Town Shop.

BUILDING INSPECTION INVENTORY
Revision 2

Municipality: Carberry		**Date:** Sept. 30, 2005
Toured By: Ray Bodnar, Keith Loney		**Construction Date:** 1971
Building: Community Centre		**Renovations:** Added insulation on roof throughout. Geothermal system added in 1994. New changing rooms and zamboni room being constructed on the east side of the rink (out to tender Sept, 2005)
Address: 500 Stickle Avenue		
L x W x H: See drawings	**Area:** Main: 4081 SM; Basement: 883 SM	
Building Capacity: see in brackets below.		
Building Floor Plan: Main Floor: hockey rink (60), Hockey Lounge (40), Curling Rink (32), Curling Lounge (30), Lobby (5), Pool Area (20). Mechanical rooms (2). Basement: Bowling Alley (20), Rifle range (6) Hockey Dressing Rooms (40)		**Occupied Times:** Hockey Rink: Oct – Apr, 4 pm – midnight; Curling: Oct – Apr, 56 hrs/week; Bowling: Oct-Apr, 42 hrs/week; Rifle: Nov-Apr, 4hrs/wk.

ARCHITECHTURAL/STRUCTURAL
Wall type/R-value: Metal frame and exterior metal cladding. Hockey rink: R2 spray-on insulation. Heated areas have R12 insulation, Curing Rink: R2 with block interior except south wall is 6” batt.
Roof Type/R-value: Sloped metal frame roof. R40 over lounge, R20 over rinks.
Door Type/weather stripping: Lounge: 4 glass doors, stripping is 6/10 - restrip; 4 wood doors from lounge to hockey rink with 1 pane glass very poor stripping, large gap – replace doors. 2 metal doors from lounge to outside – restrip. 2 ped doors from ice plant room to outside – restrip. 1 vehicle door and 1 ped door to curling rink. Restrip. 2 ped doors to hockey rink – restrip. Don’t worry about doors on east – being replaced in renovations.
Window type/caulking: Hockey lounge to rink: 2 pane –44” x 44” x 17 – replace? Curling lounge to rink: 2 pane 5’ x 6’ x8 – replace? Lounge entrance: 2 pane – 2 – 6’ x 9’ + 2 – 6’ x 4’ , poor caulking. Replace?
Other:
MECHANICAL
Heating System: Geothermal heats everything using hydronic unit heaters or forceflows except for the following areas. Pool dressing room: Lennox gas furnace 80 MBH, 80% efficient. Curling Rink: 4 gas unit heaters approx. 100 MBH input. Hockey Rink: 4 infra red gas unit heaters. Zamboni Room: hydronic heater off DHW tank (to be de-commissioned in new renovation).
Cooling System: No A/C systems.
Ventilation System: Hockey lounge: grease exhaust hood – no MUA, Exhaust fan in rifle range – no motorized damper. 2 exhaust fans in hockey rink, very leaky BDD’s. No ventilation in curling rink, lounges, or dressing rooms.
HVAC Controls: integral stats on all heaters. Note geothermal system takes a long time to heat back up.
HVAC Maintenance/Training:
Water Supply System: Well

Domestic Hot Water System: 2- 75 gal 360 MBH old gas water heater; limited insulation on piping.
Water Fixtures: Hockey lounge has low flow fixtures. Curling lounge has 5 toilets and 2 urinals – high flow. Dressing rooms have 5 toilets, 5 sinks, and 5 showers high flow. Pool change rooms 4 toilets high flow, auto shut-off showers

ELECTRICAL
Indoor Lighting: T8's in Hockey lounge. Kitchen: 4 – 8' x 2 T12; Curling lounge: 14 – 4' x 2 T12 (40W); Dressing rooms 15 – 4' x 2 T12. Rifle Range: 9 – 4' x 2 T12 plus 2 – 8' x 2 T12. Bowling: 8 – 8' 60W T12 plus 30 – 4' T12 (40W) Hockey Rink: 32 – mercury vapor 400W, 8 metal halide 400W, 12 incandescent 300 W, Outside pool lights: 10 mercury vapor on switches. Curling Rink: 4 metal halide and 4 incandescent.
Outdoor Lighting: On photocell except pool lights for night swimming.
Exit Signs: All changed to LED.
Motors:
Parking Lot Plugs: Two
OTHER BUILDING SYSTEMS
Geothermal system: 2 water furnaces with 8 loops outside the building, closed loop with propylene glycol. Desuperheater off ammonia plant helps to heat the ground loop/blding.
PROCESS SYSTEMS
1 – 84 Usgal 251 MBH input water heater for zamboni water heating at 140 F. Pool gas boilers:1 Rapak 60 MBH – 2 yrs old, 2 - Raypack 380/266 MBH – 5 yrs old, 15 HP pool pump high eff. One 40 ton, 40 HP high eff. ammonia plant for the hockey rink and one 50 ton, 50 HP high eff. for the curling rink with a common brine system. Compressor staged to maintain brine water temperature. Brine system has 2 – 20 HP low efficiency pumps. Condensers outside run in spring and fall. They have 2 – 10 HP high eff fans and 1 – 7.5 HP in-eff. motor on small condenser.
BUILDING SERVICES (Hydro, Gas, Oil, Water, etc.)
Hydro and gas.
NOTES
A Part 3 building code assessment identified several building code deficiencies with this facility and are therefore not mentioned in our report. A building addition is being added to the east side of the hockey rink consisting of dressing rooms and a new zamboni room (drawings available) Features include a new gas boiler, in-floor heating system, HRV ventilation system, R20 walls, R40 roof. Existing geothermal system is too small to heat this addition. Hockey rink can reach –25C in winter. Curling Rink kept at 8 C.

APPENDIX B

TABLES TO CALCULATE ENERGY SAVINGS

TABLE OF CONTENTS – APPENDIX B

Table B.1.1 - Energy Breakdown for Office Building

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	52,952	68%
Lighting	24,117	31%
Hot Water	782	1%
Total	**77,852**	

Table B.1.2 (a) - Electricity Usage for Office Building

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September	0	0	5,160	$0	$302	$363
October	0	0	1,560	$0	$91	$122
November	0	0	3,240	$0	$190	$234
December	0	0	2,640	$0	$155	$194
January	0	0	3,480	$0	$204	$250
February	0	0	3,000	$0	$176	$218
March	0	0	2,700	$0	$158	$198
April	0	0	2,460	$0	$144	$183
May	0	0	1,980	$0	$119	$154
June	0	0	3,360	$0	$202	$248
July	0	0	1,260	$0	$76	$104
August	0	0	6,420	$0	$385	$457
TOTAL		**0**	**37,260**	**$0**	**$2,202**	**$2,727**

Table B.1.2 (b) - Natural Gas Consumption for Office Building

Month (2004-2005)	Gas (m^3)	Gas (kWh)	Total Charge
September	0	0	$24
October	69	714	$41
November	256	2,650	$121
December	459	4,751	$204
January	858	8,880	$371
February	932	9,646	$400
March	589	6,096	$251
April	311	3,219	$138
May	195	2,018	$94
June	193	1,997	$106
July	52	538	$35
August	8	83	$27
TOTAL	**3,922**	**40,592**	**$1,812**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.1.3 - Lighting Analysis Summary for Office Building

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Fluorescents - Convert 4' T12s to 4' T8s (2x2)	4	408	$24	245	$15
Fluorescents - Convert 4' T12s to 4' T8s (49x4)	196	19,976	$1,199	12,027	$722
Incandescents in Mech Room - Convert to compact fluorescents	2	416	$25	116	$7
Outdoor Incandescents - Convert to high pressure sodium	1	657	$39	329	$20
Exit Signs - Convert Incandescents to LEDs	3	788	$47	79	$5
Install Parking Lot Controllers	3	1,872	$112	936	$56
TOTALS		**24,117**	**$1,448**	**13,732**	**$824**

Annual Energy Savings (kWh)	**10,386**
Annual Cost Savings	**$624**
Percent Annual Energy Savings	**43%**

These calculations are assuming that the Office Building is occupied for 40 hours a week (2080 hours/year)

The Exit signs are assumed to be on 24 hours a day, 365 days per year

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.1.4 Window and Door Infiltration Calculations for Office Building

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Windows 6' x 6' (3)	18	0.025	50	25	8,534,565	2,501	$114
Pedestrian Doors 3' x 7' (2)	10	0.05	125	34	11,853,563	3,474	$159
TOTAL						**5,975**	**$273**

The crack length around the windows is an eighth of the perimeter and around the doors is a quarter of the perimeter

The office is assumed to be kept at 70 F

Table B.1.5 - Water Usage for Office Building

Fixtures	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Sinks	2	2	8,190	1.60	13,104	0.32	2,621	10,483	393	$24
Toilets	2	2	8,190	13.25	108,518	6.00	49,140	59,378	NA	NA
Total					**121,622**		**51,761**	**69,861**	**393**	**$24**

Frequency at Which Fixtures are Used			
	Females	Males	Totals
Number of People	4	4	
Number of Toilet Uses/day	3	4	
Number of Toilets	2	2	
Toilet Uses/hour/fixture	0.75	1	1.75
Number of Sinks	2	2	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	0.75	1	1.75

Current Hot Water Usage (kWh)		
Fixture	L/Yr	kWh
Sinks	13,104	491
Total	**13,104**	**491**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush

Table B.1.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Office Building

Description	% of Time Unoccupied	HDD below 70 F	HDD below 59 F	Current Energy Used to Heat	Heat Savings (KWH)
Setback thermostats to 59 F	73.29%	10711.26	9,080	45,752	5,107

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Replace furnace with high efficiency furnace	2	0.8	0.95	6,863

Description	Quantity	Flow Rate (cfm)	Heat Loss (kWh)	Energy Savings for 1 HRV (kWh)	Energy Savings for all HRVs (kWh)
Install HRVs	2	200	4,067	2,034	4,067

Description	Annual Energy Savings (kWh)	Annual Cost Savings ($)	Installation Cost	Simple Payback Years
Install Geothermal Heating System	35,301	$1,613	$48,325	29.95

Table B.2.1 - Energy Breakdown for the Old Office Building

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	106,743	89%
Lighting	11,616	10%
Hot Water	1,553	1%
Total	**119,913**	

Table B.2.2 (a) - Electricity Usage for Old Office Building

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September	0	0	2,080	$0	$122	$157
October	0	0	970	$0	$57	$83
November	0	0	1,200	$0	$70	$98
December	0	0	1,290	$0	$76	$104
January	0	0	1,250	$0	$73	$101
February	0	0	1,760	$0	$103	$136
March	0	0	1,020	$0	$60	$86
April	0	0	1,240	$0	$73	$101
May	0	0	1,020	$0	$61	$88
June	0	0	990	$0	$59	$86
July	0	0	1,510	$0	$91	$121
August	0	0	3,690	$0	$222	$271
TOTAL		**0**	**18,020**	**$0**	**$1,066**	**$1,432**

Table B.2.2 (b) - Natural Gas Consumption for Old Office Building

Month (2004-2005)	Gas (m^3)	Gas (kWh)	Total Charge
September	217	2,246	$105
October	600	6,210	$275
November	429	4,440	$187
December	1,293	13,382	$554
January	1,744	18,050	$743
February	2,057	21,289	$868
March	1,268	13,123	$529
April	1,265	13,092	$527
May	564	5,837	$249
June	248	2,567	$124
July	28	290	$24
August	132	1,366	$72
TOTAL	**9,845**	**101,893**	**$4,257**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.2.3 - Lighting Analysis Summary for Old Office Building

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Fluorescents - Convert 4' T12s to 4' T8s (33x2)	66	6,727	$404	4,050	$243
Basement Fluorescents - Convert 4' T12s to 4' T8s (8x2)	16	163	$10	98	$6
Basement Fluorescents - Convert 4' T12s to 4' T8s (5x4)	20	204	$12	123	$7
Main Floor Incandescents - Convert to compact fluorescents	3	624	$37	175	$10
Basement Incandescents - Convert to compact fluorescents	9	187	$11	52	$3
Outdoor Incandescents - Convert to High Pressure Sodium	3	788	$47	394	$24
Exit Signs - Convert Incandescents to LEDs	4	1,051	$63	105	$6
Parking Lot Controllers	3	1,872	$112	936	$56
TOTALS		**11,616**	**$697**	**5,933**	**$356**

Annual Energy Savings (KWH)	**5,683**
Annual Cost Savings	**$341**
Percent Annual Energy Savings	**49%**

These calculations are assuming that the main floor of the Old Office Building is occupied for 40 hours a week (2080 hours/year) and the basement is occupied for 4 hours a week (208 hours/year)

The Exit signs are assumed to be on 24 hours a day, 365 days per year.

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.2.4 (a) Window and Door Replacement Calculations for Old Office Building

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace old 7'x3' wood door to basement with an insulated wood door	21	1.578	1,572	$72	6.67	372	$17	1,200	$55
Replace wood access hatch to basement with an insulated hatch	12	1.578	898	$41	6.67	213	$10	686	$31
Replace 7'x4.4' windows in front with triple pane windows (2)	63	2.000	3,721	$170	6.25	1,191	$54	2,530	$116
Replace 75"x30" windows with triple pane windows (11)	172	2.000	10,151	$464	6.25	3,248	$148	6,903	$315
Replace 35"x51" windows with triple pane windows (10)	124	2.000	7,321	$335	6.25	2,343	$107	4,978	$228
Replace 30"x30" windows with triple pane windows (2)	13	2.000	738	$34	6.25	236	$11	502	$23
Replace 35"x51" broken window with triple pane window (1)	12	1.500	976	$45	6.25	234	$11	742	$34
TOTALS	417		**25,378**	**$1,160**		**7,837**	**$358**	**17,542**	**$802**

Table B.2.4 (b) Window and Door Infiltration Calculations for Old Office Building

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Windows (26)	50	0.025	50	69	29,842,056	8,746	$400
Wood access hatch to basement	3.5	0.05	125	12	5,203,713	1,525	$70
Pedestrian doors in front and back (2)	10	0.05	125	34	14,867,752	4,357	$199
Window in front door	5	0.025	50	7	2,973,550	871	$40
TOTALS						**15,500**	**$708**

Table B.2.4 (c) Wall/Roof Insulation Upgrade for Old Office Building

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Upgrade roof insulation	2067	12.000	20,347	$930	40	6,104	$279	14,243	$651
Upgrade wall insulation	2495	12.000	24,562	$1,122	20	14,737	$673	9,825	$449
TOTALS			**44,909**	**$930**		**6,104**	**$279**	**14,243**	**$651**

The crack length around the doors is a quarter the perimeter (except door to basement - half length of perimeter)

The crack length around the windows is an eigth of the perimter

The office is assumed to be kept at 70 F

The cost of natural gas to heat the old office building is 0.0457 $/kWh (as of November 1st, 2005)

Table B.2.5 - Water Usage for Old Office Building

Fixtures	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Sinks	4	0.8	6,500	1.60	10,400	0.32	2,080	8,320	312	$14
Toilets	4	0.4	3,380	13.25	44,785	6.00	20,280	24,505	NA	NA
Urinal	1	1.5	3,120	9.50	29,640	3.80	11,856	17,784	NA	NA
Total					**55,185**		**22,360**	**32,825**	**312**	**$14**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	3	4	
Number of Toilet Uses/day	3	1	
Number of Toilets	4	4	
Toilet Uses/hour/fixture	0.28	0.13	0.41
Number of urinal uses/day	0	3	
Number of urinals	1	1	
urinal uses/hour/fixture	0	1.5	1.5
Number of Sinks	4	4	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	0.28	0.50	0.78

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sinks	10,400	390
Total		**390**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush

The current urinals consume 2.5 gpm and the new urinals are 1 gpm

Table B.2.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Old Office Building

Description	% of Time Unoccupied	HDD below 70 F	HDD below 59 F	Current Energy Used to Heat Basement (kWh)	Heat Savings (kWh)
Setback thermostats to 59 F	97.63%	10711.26	9,080	30,703	4,565

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (KWH)
Replace furnace with high efficiency furnace	2	65%	95%	30,703

Description	Quantity	Flow Rate (cfm)	Heat Loss (kWh)	Energy Savings for 1 HRV (kWh)	Energy Savings for all HRVs (kWh)
Install HRV	1	200	6,257	3,129	3,129

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Replace hot water heater with high efficiency hot water heater	1	80%	95%	233

Description	Quantity	% Efficiency Savings	Energy Savings (kWh)
Replace AC with high efficiency AC	1	0.35	1,540

Table B.3.1 - Energy Breakdown for the Town Shop

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	113,063	94%
Lighting	5,276	4%
Hot Water	1,917	2%
Total	**120,256**	

Table B.3.2 (a) - Electricity Usage for Town Shop

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September	0	0	860	$0	$50	$93
October	0	0	0	$0	$0	$0
November	0	0	1,139	$0	$67	$126
December	0	0	0	$0	$0	$0
January	0	0	2,272	$0	$133	$188
February	0	0	0	$0	$0	$0
March	0	0	1,786	$0	$105	$155
April	0	0	0	$0	$0	$0
May	0	0	863	$0	$52	$95
June	0	0	292	$0	$18	$38
July	0	0	350	$0	$21	$42
August	0	0	327	$0	$20	$40
TOTAL		**0**	**7,889**	**$0**	**$465**	**$777**

Table B.3.2 (b) - Natural Gas Consumption for Town Shop

Month (2004-2005)	Gas (m^3)	Gas (kWh)	Total Charge
September	47	486	$32
October	305	3,157	$143
November	657	6,800	$295
December	1,686	17,450	$719
January	3,410	35,292	$1,442
February	1,944	20,120	$809
March	1,474	15,255	$613
April	748	7,742	$317
May	308	3,188	$148
June	0	0	$0
July	162	1,677	$97
August	116	1,201	$65
TOTAL	**10,857**	**112,367**	**$4,680**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.3.3 - Lighting Analysis Summary for Town Shop

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Indoor Fluorescents - Convert 8' T12s to 8' T8s (6x2)	12	1,930	$116	899	$54
Indoor 100 W Incandescents - Convert to Compact Fluorescents	8	1,664	$100	466	$28
Indoor Fluorescents - Convert 4' T12s to 4' T8s (1x2)	2	204	$12	123	$7
Outdoor Incandescents - Convert to High Pressure Sodium	1	438	$26	219	$13
Parking lot plug-ins	1	624	$37	624	$37
Ceiling Fans	2	416	$25	416	$25
TOTALS		**5,276**	**$317**	**2,746**	**$165**

Annual Energy Savings (kWh)	**2,530**
Annual Cost Savings	**$152**
Percent Annual Energy Savings	**48%**

The Town Shop is occupied Monday to Friday, 8 hours a day year round (2080 hours per year)

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.3.4 (a) Window and Door Replacement Calculations for Town Shop

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace pedestrian door with an insulated door	21	1.578	1,254	$57	6.67	297	$14	957	$44
Replace vehicle door with an insulated door	168	2.000	7,911	$362	6.8	2,327	$106	5,584	$255
Replace windows with triple pane windows (4)	65	1.000	6,091	$278	6.25	975	$45	5,117	$234
TOTALS			**14,002**	**$640**		**3,301**	**$151**	**10,701**	**$489**

Table B.3.4 (b) Window and Door Infiltration Calculations for Town Shop

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Windows (4)	16	0.025	50	22	7,775,937	2,279	$104
Old pedestrian door (1)	5	0.05	125	17	5,926,781	1,737	$79
New pedestrian door (1)	5	0.05	125	17	5,926,781	1,737	$79
Vehicle door	13	0.05	125	44	15,409,631	4,516	$206
TOTALS						**10,269**	**$469**

Table B.3.4 (c) Wall/Roof Insulation Upgrade for Town Shop

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Upgrade roof insulation (everywhere except	2,727	5.000	16,115	$736	40	2,014	$92	14,101	$644
Ugrade wall insulation (for vehicle storage rooms and pump room)	2,768	6.000	13,634	$623	20	4,090	$187	9,544	$436
Upgrade wall insulation (for shop)	2,320	6.000	36,414	$1,664	20	10,924	$499	25,490	$1,165
TOTALS			**66,163**	**$3,024**		**17,029**	**$778**	**49,135**	**$2,245**

The crack length around the old doors is half the perimeter and around the new doors is a quarter of the perimeter
The crack length around the windows is a quarter of the perimter
The shop is assumed to be kept at 70 F and the other rooms at 50 F

Table B.3.5 - Water Usage for Town Shop

Fixtures	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Sinks	1	1.4	2,860	1.60	4,576	0.32	915	3,661	137	$8
Toilets	1	1.4	2,860	13.25	37,895	6.00	17,160	20,735	NA	NA
Total					**42,471**		**18,075**	**24,396**	**137**	**$8**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	1	2	
Number of Toilet Uses/day	3	4	
Number of Toilets	1	1	
Toilet Uses/hour/fixture	0.375	1	1.375
Number of Sinks	1	1	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	0.375	1	1.375

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sinks	4,576	171
Total		**171**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush

Table B.3.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Town Shop

Description	% of Time Unoccupied	HDD below 70 F	HDD below 59 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback thermostats to 59 F	76.26%	10711.26	9,080	49,441	5,742

Description	Current Efficiency	New Efficiency	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Replace unit heaters with high efficiency furnaces	80%	95%	113,063	16,959

Table B.4.1 - Energy Breakdown for Carberry Community Hall

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	152,041	86%
Lighting	13,399	8%
Hot Water	11,934	7%
Total	**177,374**	

Table B.4.2 (a) - Electricity Usage for Carberry Community Hall

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September	0	0	1,081	$0	$63	$99
October	0	0	1,501	$0	$88	$127
November	0	0	2,401	$0	$141	$187
December	0	0	2,161	$0	$127	$171
January	0	0	2,341	$0	$137	$183
February	0	0	1,801	$0	$106	$147
March	0	0	1,801	$0	$106	$147
April	0	0	481	$0	$28	$59
May	0	0	0	$0	$0	$0
June	0	0	1,201	$0	$72	$127
July	0	0	0	$0	$0	$0
August	0	0	901	$0	$54	$107
TOTAL		**0**	**15,670**	**$0**	**$921**	**$1,356**

Table B.4.2 (b) - Natural Gas Consumption for Carberry Community Hall

Month (2004-2005)	Gas (m^3)	Gas (kWh)	Total Charge
September	223	2,308	$107
October	490	5,071	$222
November	886	9,170	$390
December	1,590	16,456	$678
January	3,058	31,649	$1,295
February	3,176	32,871	$1,334
March	2,123	21,972	$877
April	2,659	27,520	$1,096
May	883	9,139	$384
June	374	3,871	$182
July	0	0	$0
August	162	1,677	$97
TOTAL	**15,624**	**161,704**	**$6,663**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.4.3 - Lighting Analysis Summary for Carberry Community Hall

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Fluorescents Lamps- Convert 4' T12s to 4' T8s (41x2)	82	5,014	$301	1,325	$80
4' T5 Fluorescents Lamps (19x4)	76	2,656	$159	2,656	$159
Indoor 100 W Incandescents - Convert to Compact Fluorescents	8	998	$60	280	$17
Outdoor Incandescents - Convert to High Pressure Sodium	6	2,628	$158	1,314	$79
Exit Signs - Convert Incandescents to LEDs	8	2,102	$126	210	$13
TOTALS		**13,399**	**$804**	**5,785**	**$347**

Annual Energy Savings (kWh)	**7,614**
Annual Cost Savings	**$457**
Percent Annual Energy Savings	**57%**

These calculations are assuming that the Community Hall is occupied 24 hours per week (1248 hours/year)

The exit signs are on 24/7.

The outdoor lights are on 12 hours per day year round.

Table B.4.4 (a) Window and Door Replacement Calculations for Carberry Community Hall

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace old wood double door on east wall with an insulated door	42	1.578	2,507	$115	6.67	593	$27	1,914	$87
Replace single door on east wall with an insulated door	21	1.578	1,254	$57	6.67	297	$14	957	$44
TOTALS			**3,761**	**$172**		**890**	**$41**	**2,871**	**$131**

Table B.4.4 (b) Window and Door Infiltration Calculations for Carberry Community Hall

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Windows, 30"x30" (1)	3	0.025	50	3	1,185,356	347	$16
Pedestrian doors, 3'x7' (5)	25	0.05	125	85	29,633,907	8,685	$397
Old wood double door on east wall, 6'x7' (1)	10	0.05	125	32	11,260,884	3,300	$151
Single door on east wall, 3'x7' (1)	7	0.05	125	22	7,704,816	2,258	$103
TOTALS						**14,591**	**$667**

The crack length around the doors and windows is a quarter of the perimter

The hall is assumed to be kept at 70 F

Table B.4.5 - Water Usage for the Community Hall

Fixtures	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Sinks	10	8.8	109,200	1.60	174,720	0.32	34,944	139,776	5,238	$314
Toilets	9	5.6	62,400	13.25	826,800	6.00	374,400	452,400	NA	NA
Urinals	2	18.8	46,800	9.50	444,600	3.80	177,840	266,760	NA	NA
Total					**1,446,120**		**587,184**	**858,936**	**5,238**	**$314**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	100	100	
Number of Toilet Uses/day	3	1	
Number of Toilets	9	9	
Toilet Uses/hour/fixture	4.2	1.4	5.6
Number of Urinal Uses/day	0	3	
Number of Urinals	2	2	
Urinal Uses/hour/fixture	0	18.8	18.8
Number of Sinks	10	10	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	3.75	5	8.75

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sinks	174,720	6,547
Total		**6,547**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush

The current urinals are assumed to use 2.5 gallons per flush and the new urinals use 1 gallons per flush

Table B.4.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Carberry Community Hall

Description	% of Time Unoccupied	HDD below 70 F	HDD below 59 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback thermostats to 59 F	85.75%	10711.26	9,080	151,041	19,726

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Replace furnace with high efficiency furnace	3	80%	95%	22,656

Description	Quantity	Efficiency Savings	Energy Savings (kWh)
Replace condensers with high efficiency condensers	4	21%	210

Table B.5.1 - Energy Breakdown for Museum and Cultural Centre

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	55,864	96%
Lighting	972	2%
Hot Water	1,374	2%
Total	**58,210**	

Table B.5.2 (a) - Electricity Usage for Museum and Cultural Centre

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September	0	0	1,540	$0	$90	$121
October	0	0	440	$0	$26	$47
November	0	0	710	$0	$42	$76
December	0	0	1,340	$0	$79	$107
January	0	0	2,140	$0	$125	$161
February	0	0	1,460	$0	$86	$115
March	0	0	570	$0	$33	$56
April	0	0	790	$0	$46	$72
May	0	0	210	$0	$13	$32
June	0	0	170	$0	$10	$30
July	0	0	1,040	$0	$62	$89
August	0	0	460	$0	$28	$50
TOTAL		**0**	**10,870**	**$0**	**$640**	**$956**

Table B.5.2 (b) - Natural Gas Consumption for Museum and Cultural Centre

Month (2004-2005)	Gas (m^3)	Gas (kWh)	Total Charge
September	19	197	$20
October	149	1,542	$75
November	462	4,782	$212
December	674	6,976	$294
January	1,284	13,289	$550
February	770	7,969	$327
March	633	6,551	$269
April	319	3,302	$142
May	179	1,853	$91
June	19	197	$20
July	58	600	$38
August	8	83	$15
TOTAL	**4,574**	**47,340**	**$2,054**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.5.3 - Lighting Analysis Summary for the Museum and Cultural Centre

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Main Floor Incandescents - Convert to Compact Fluorescents	13	585	$35	164	$10
Second Floor Incandescents - Convert to Compact Fluorescents	5	225	$14	63	$4
Second Floor Fluorescents - Conver 8' T12s to 8' T8s (3x2)	6	162	$10	119	$7
TOTALS		**972**	**$58**	**346**	**$21**

Annual Energy Savings (kWh)	**626**
Annual Cost Savings	**$38**
Percent Annual Energy Savings	**64%**

These calculations are assuming that the Carberry Museum and Cultural Centre are occupied for 5 hours a day, from June to August (450 hours per year)

Table B.5.4 (a) Window and Door Replacement Calculations for Museum and Cultural Centre

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace old double door in front with an insulated door	42	1.578	2,211	$101	6.67	523	$24	1,688	$77
Replace old steel door to second floor with insulated door	21	1.500	698	$42	6.84	153	$9	545	$33
Replace old wood door to second floor storage with an insulated door	21	1.578	663	$40	6.67	157	$9	506	$30
Replace single pane, boarded up windows, 24"x56" with triple pane windows	37	1.000	3,100	$142	6.25	496	$23	2,604	$119
TOTALS			**2,211**	**$101**		**523**	**$24**	**1,688**	**$77**

Table B.5.4 (b) Window and Door Infiltration Calculations for Museum and Cultural Centre

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Double wood door in front, 6'x7' (1)	13	0.05	125	44	13,587,883	3,982	$182
Single pane, boarded up windows, 24"x56" (4)	13	0.025	50	18	5,574,516	1,634	$75
Window air conditioning unit, 30"x37"	6	0.05	125	19	3,501,493	1,026	$62
TOTALS						**3,982**	**$182**

The temperature of the museum is assumed to be kept at 70 F in the summer and 50 F in the winter

The crack length around the windows and doors is taken as a quarter of the perimeter

The crack length around the window air conditioning unit is taken as half of the perimeter

Table B.5.5 - Water Usage for the Museum and Cultural Centre

Fixtures	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Sinks	2	3.3	2,925	1.60	4,680	0.32	936	3,744	140	$6
Toilets	2	3.3	2,925	13.25	38,756	6.00	17,550	21,206	NA	NA
Total					**43,436**		**18,486**	**24,950**	**140**	**$6**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	8	7	
Number of Toilet Uses/day	3	4	
Number of Toilets	2	2	
Toilet Uses/hour/fixture	1.5	1.8	3.3
Number of Sinks	2	2	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	1.5	1.75	3.25

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sinks	4,680	175
Total		**175**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush

Table B.5.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Museum and Cultural Centre

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Replace furnace with high efficiency furnace	1	60%	95%	9,356

Table B.6.1 - Energy Breakdown for Public Washrooms

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	7,142	55%
Lighting	3,995	31%
Hot Water	1,894	15%
Total	**13,030**	

Table B.6.2 (a) - Electricity Usage for Public Washrooms

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September	0	0	770	$0	$45	$69
October	0	0	590	$0	$35	$57
November	0	0	910	$0	$53	$79
December	0	0	1,440	$0	$84	$114
January	0	0	1,740	$0	$102	$134
February	0	0	2,230	$0	$131	$167
March	0	0	1,300	$0	$76	$105
April	0	0	1,440	$0	$84	$115
May	0	0	820	$0	$49	$74
June	0	0	850	$0	$51	$76
July	0	0	390	$0	$23	$45
August	0	0	550	$0	$33	$56
TOTAL		**0**	**13,030**	**$0**	**$767**	**$1,091**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.6.3 - Lighting Analysis Summary for Public Washrooms

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Indoor Fluorescents - Convert 4' T12s to 4' T8s (2x2) and put on timer	8	1,717	$103	517	$31
Indoor Incandescents - Convert to Compact Fluorescents and put on timer	4	1,752	$105	245	$15
Outdoor Incandescents - Convert to High Pressure Sodium Lights	2	526	$32	263	$16
TOTALS		**3,995**	**$240**	**1,025**	**$62**

Annual Energy Savings (kWh)	**2,970**
Annual Cost Savings	**$178**
Percent Annual Energy Savings	**74%**

The lights in the rest room are assumed to be on for 12 hours per day year round (4380 hours/year)

The outdoor lights are assumed to be on 12 hours per day, 365 days per year.

Table B.6.4 Window and Door Infiltration Calculations for Public Washrooms

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Metal Doors (2)	10	0.05	125	34	9,482,620	2,779	$167
TOTALS						**2,779**	**$167**

The crack lengths are taken as a quarter of the perimeter of the door

The doors are assumed to be 3'x7'

Table B.6.5 - Water Usage for Public Washrooms

Fixtures	Qty	Est. # of Uses/Hr/Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Sinks	2	0.4	3,833	1.60	6,132	1.60	6,132	0	0	$0
Toilets	4	0.1	2,190	13.25	29,018	6.00	13,140	15,878	NA	NA
Urinals	1	0.4	1,643	3.80	6,242	3.80	6,242	0	NA	NA
Total					**41,391**		**25,514**	**15,878**	**0**	**$0**

Frequency at Which Fixtures are Used			
	Females	Males	Totals
Number of People	1	1	
Number of Toilet Uses/day	3	1	
Number of Toilets	4	4	
Toilet Uses/hour/fixture	0.09	0.03	0.13
Number of Urinal Uses/day	0	3	
Number of Urinals	1	1	
Urinal Uses/hour/fixture	0.00	0.38	0.38
Number of Sinks	2	2	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	0.19	0.25	0.44

Current Hot Water Usage (kWh)		
Fixture	L/Yr	kWh
Sinks	6,132	230
Total		**230**

The current sinks are assumed to consume 2.5 gpm

The current water closets are assumed to use 3.5 gallons per flush and the new wash closets use 1.5 gallons per flush

The current urinal consumes 1 gallon per flush

Table B.6.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Public Washrooms

Description	% of Time Unoccupied	HDD below 70 F	HDD below 59 F	Current Energy Used to Heat	Heat Savings (kWh)
Setback thermostats to 59 F	50%	10711.26	9,080	7,142	544

Description	Quantity	Flow Rate (cfm)	Heat Loss (kWh)	Energy Savings (kWh)
Install motorized damper on exhaust	1	10	813	813

Table B.7.1 - Energy Breakdown for the Fire Hall

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	83,960	95%
Lighting	2,451	3%
Hot Water	1,920	2%
Total	**88,331**	

Table B.7.2 (a) - Electricity Usage for Fire Hall

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September	0	0	570	$0	$33	$56
October	0	0	1,100	$0	$64	$91
November	0	0	2,100	$0	$123	$168
December	0	0	2,630	$0	$154	$194
January	0	0	3,560	$0	$209	$256
February	0	0	2,820	$0	$165	$206
March	0	0	1,970	$0	$115	$150
April	0	0	1,750	$0	$103	$137
May	0	0	980	$0	$59	$85
June	0	0	680	$0	$41	$65
July	0	0	770	$0	$46	$71
August	0	0	700	$0	$42	$66
TOTAL		**0**	**19,630**	**$0**	**$1,155**	**$1,545**

Table B.7.2 (b) - Natural Gas Consumption for Fire Hall

Month (2004-2005)	Gas (m^3)	Gas (kWh)	Total Charge
September	44	455	$30
October	278	2,877	$131
November	564	5,837	$256
December	927	9,594	$400
January	1,653	17,108	$705
February	1,045	10,815	$440
March	982	10,163	$412
April	490	5,071	$211
May	393	4,067	$186
June	91	942	$53
July	99	1,025	$57
August	72	745	$45
TOTAL	**6,638**	**68,701**	**$2,926**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.7.3 - Lighting Analysis Summary for Fire Hall

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (KWH)	Annual Cost
Meeting Room Fluorescents - Convert 4' T12s to 4' T8s (13x2)	26	265	$16	160	$10
Garage Fluorescents - Convert 8' T12s to 8' T8s (9x2)	18	434	$26	206	$12
Outdoor Incandescents - Convert to High Pressure Sodium Lights	4	1,752	$105	37	$2
TOTALS		**2,451**	**$147**	**402**	**$24**

Annual Energy Savings (kWh)	**2,049**
Annual Cost Savings	**$123**
Percent Annual Energy Savings	**84%**

The fire hall is assumed to be occupied 4 hours a week year round (208 hours/year)

Table B.7.4 Window and Door Infiltration Calculations for Fire Hall

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Pedestrian doors, 3'x7' (3)	15	0.05	125	51	16,933,661	4,963	$227
Vehicle doors, 20'x12' (2)	32	0.05	125	109	36,125,143	10,587	$484
Windows, 3.6'x2' (2)	6	0.025	50	8	2,528,760	741	$34
TOTALS						**16,291**	**$745**

The temperature of the hall is assumed to be kept at 70 F

The crack length around the 1 pedestrian door and the vehicle doors is taken as half the perimeter

The crack length for the other 2 pedestrian doors is taken as 1/8 the perimeter

The crack length around the windows is taken as a quarter of the perimeter

Table B.7.5 - Water Usage for Fire Hall

Fixtures	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Sinks	2	2.9	1,196	1.60	1,914	0.32	383	1,531	57	$3
Toilets	2	1.0	416	13.25	5,512	6.00	2,496	3,016	NA	NA
Urinals	1	3.8	780	9.50	7,410	3.80	2,964	4,446	NA	NA
Showers	2	0.3	104	47.32	4,921	47.32	4,921	0	0	$0
Total					**19,757**		**10,764**	**8,993**	**57**	**$3**

Frequency at Which Fixtures are Used			
	Females	Males	Totals
Number of People	2	10	
Number of Toilet Uses/day	3	1	
Number of Toilets	2	2	
Toilet Uses/hour/fixture	0.4	0.6	1.0
Number of Urinal Uses/day	0.0	3.0	
Number of Urinals	1.0	1.0	
Urinal Uses/hour/fixture	0.0	3.8	3.8
Number of Sinks	2	2	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	0.375	2.5	2.875

Current Hot Water Usage (kWh)		
Fixture	L/Yr	kWh
Sinks	1,914	72
Showers	4,921	184
Total		**256**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush

The current urinals are assumed to consume 2.5 gpm and the new urinals consume 1 gpm

The cost of primary natural gas to heat water is 0.3507 $/m^3 (as of November 1st, 2005)

Table B.7.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Fire Hall

Description	% of Time Unoccupied	HDD below 70 F	HDD below 59 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Setback thermostats to 59 F	97.63%	10,711	9,080	83,960	12,484

Description	Quantity	Flow Rate (cfm)	Heat Loss (kWh)	Energy Savings for HRV (kWh)
Install HRV	1	200	4,067	2,034

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (KWH)
Replace unit heaters with high efficiency furnaces	2	75%	95%	13,434

Table B.8.1 - Energy Breakdown for Recycling Building

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	75,279	96%
Lighting	1,285	2%
Hot Water	1,559	2%
Total	**78,123**	

Table B.8.2 (a) - Electricity Usage for Recycling Building

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September	0	0	200	$0	$12	$62
October	0	0	0	$0	$0	$0
November	0	0	480	$0	$28	$82
December	0	0	0	$0	$0	$0
January	0	0	480	$0	$28	$82
February	0	0	0	$0	$0	$0
March	0	0	270	$0	$16	$68
April	0	0	0	$0	$0	$0
May	0	0	140	$0	$8	$60
June	0	0	20	$0	$1	$26
July	0	0	60	$0	$4	$29
August	0	0	40	$0	$2	$28
TOTAL		**0**	**1,690**	**$0**	**$99**	**$437**

Table B.8.2 (b) - Natural Gas Consumption for Recycling Building

Month (2004-2005)	Gas (m^3)	Gas (kWh)	Total Charge
September	44	455	30
October	327	3,384	152
November	3	31	13
December	1,257	13,010	539
January	1,477	15,287	631
February	1,735	17,957	$734
March	1,163	12,037	$486
April	1,051	10,878	$440
May	88	911	$49
June	0	0	$0
July	146	1,511	$89
August	94	973	$55
TOTAL	**7,385**	**76,433**	**$3,217**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.8.3 - Lighting Analysis Summary for Recycling Building

Description	Quantity	Current Conditions: Annual Energy Consumption (kWh)	Current Conditions: Annual Cost	After Improvements: Annual Energy Consumption (kWh)	After Improvements: Annual Cost
Indoor Fluorescents - Convert 8' T12s to 8' T8s (13x2)	26	392	$24	72	$4
Indoor Incandescents - Convert to Compact Fluorescents (6)	6	390	$23	106	$6
Indoor Metal Halide	1	65	$4	65	$4
Outdoor Incandescents - Convert to High Pressure Sodium	1	438	$26	219	$13
TOTALS		**1,285**	**$77**	**462**	**$28**

Annual Energy Savings (kWh)	**824**
Annual Cost Savings	**$49**
Percent Annual Energy Savings	**64%**

The recycling building is assumed to be occupied for 15 hours per week year round (780 hours per year)

Table B.8.4 (a) Window and Door Replacement Calculations for Recycling Building

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace vehicle door with insulated vehicle door (1)	182	1.578	5,292	$242	6.67	1,252	$57	4,041	$185
Replace boarded up doors with insulated wall (2)	42	1.578	1,221	$56	20	96	$4	1,125	$51
TOTALS			**5,292**	**$242**		**1,252**	**$57**	**4,041**	**$185**

Table B.8.4 (b) Window and Door Infiltration Calculations for Recycling Building

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Vehicle Door, 14'x13' (1)	27	0.05	125	92	15,590,458	4,569	$209
Pedestrian Door, 3'x7' (1)	10	0.05	125	34	5,774,244	1,692	$77
Boarded up doors, 3'x7' (2)	20	0.05	125	68	11,548,487	3,385	$155
Windows, 44"x44"(2)	7.33	0.025	50	10	1,693,778	496	$23
TOTALS						**10,142**	**$464**

The temperature of the Recycling Building is assumed to be kept at 40 F.

The crack lengths are assumed to be half the perimeter of the vehicle and boarded doors and a quarter of the perimeter of the metal doors

The crack lengths around the windows are assumed to be a quarter of their perimeter

Table B.8.5 - Water Usage for Recycling Building

Fixtures	Qty	Est. # of Uses/Hr/Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (KWH)	Cost Savings
Sinks	1	1.0	260	1.60	416	0.32	83	333	12	$1
Toilets	1	1.0	260	13.25	3,445	6.00	1,560	1,885	NA	NA
Showers	1	0.2	52	66.25	3,445	47.32	2,461	984	37	$2
Total					**7,306**		**4,104**	**3,202**	**49**	**$3**

Frequency at Which Fixtures are Used			
	Females	Males	Totals
Number of People	0	2	
Number of Toilet Uses/day	3	4	
Number of Toilets	1	1	
Toilet Uses/hour/fixture	0.0	1.0	1.0
Number of Sinks	1	1	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	0	1	1

Current Hot Water Usage (kWh)		
Fixture	L/Yr	kWh
Sinks	416	16
Showers	3,445	129
Total		**145**

The current sinks are assumed to consume 2.5 gpm and the new sinks are 0.5 gpm

The current toilets are assumed to use 3.5 gallons per flush and the new toilets use 1.5 gallons per flush

The current urinals are assumed to consume 2.5 gpm and the new urinals consume 1 gpm

Table B.8.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Recycling Buildings

Description	HDD below 40 F	HDD below 35 F	Current Energy Used to Heat (kWh)	Heat Savings (kWh)
Replace unit heaters with high radiant heaters	4,892	4,127	75,279	11,775

Table B.9.1 - Energy Breakdown for Community Centre

	Energy Consumption (kWh)	% of Total Energy Consumption
HVAC	476,933	41%
Lighting	324,549	28%
Hot Water	24,011	2%
Motors	111,375	10%
Pool Heater	165,000	14%
Zamboni Heater	50,000	4%
Total	**1,151,868**	

Table B.9.2 (a) - Electricity Usage for Community Centre

	Consumption Data			Calculated Costs		
Month (2004-2005)	Maximum KVA	Billed KVA	Energy (kWh)	Demand Charge	Energy Charge	Total Charge
September	0	0	17,610	$0	$901	$1,220
October	0	0	28,000	$0	$1,174	$2,349
November	0	0	66,400	$0	$2,072	$3,676
December	0	0	61,200	$0	$1,950	$3,537
January	0	0	60,800	$0	$1,941	$3,603
February	0	0	54,000	$0	$1,782	$3,345
March	0	0	57,600	$0	$1,866	$3,517
April	0	0	47,200	$0	$1,623	$3,257
May	0	0	16,400	$0	$875	$1,105
June	0	0	20,800	$0	$1,030	$1,307
July	0	0	15,600	$0	$843	$1,332
August	0	0	18,800	$0	$969	$987
TOTAL		**0**	**464,410**	**$0**	**$17,027**	**$29,235**

Table B.9.2 (b) - Natural Gas Consumption for Community Centre

Month (2004-2005)	Gas (m^3)	Gas (kWh)	Total Charge
September	8,016	82,963	3,101
October	215	2,225	161
November	4,183	43,293	1,649
December	6,064	62,761	2,329
January	9,697	100,361	3,677
February	8,319	86,099	$3,128
March	7,370	76,277	$2,688
April	5,019	51,945	$1,856
May	1,394	14,427	$675
June	3,556	36,804	$1,722
July	7,032	72,779	$3,316
August	5,558	57,524	$2,667
TOTAL	**66,423**	**687,458**	**$26,969**

Notes

There is no charge for the first 50 KVA of monthly demand; a charge of $8.32 is applied to each KVA above 50.

The Total Charge column includes the energy charge, the demand charge, the monthly basic charge, and 14% taxes.

Table B.9.3 - Lighting Analysis Summary for Community Centre

Description	Quantity	Current Conditions		After Improvements	
		Annual Energy Consumption (kWh)	Annual Cost	Annual Energy Consumption (kWh)	Annual Cost
Hockey Lounge 4' T8 Fluorescents (21x2)	42	1,976	$119	1,976	$119
Hockey rink - 400W Mercury Vapor	32	21,504	$1,291	21,504	$1,291
Hockey rink - 400W Metal Halides	8	5,376	$323	5,376	$323
Hockey rink - 300W Incandescent Bulbs - Convert to Metal Halides	12	6,048	$363	2,016	$121
Kitchen - Convert 8' T12s to 8' T8s (4x2)	8	1,559	$94	739	$44
Curling lounge - Convert 4' T12s to 4' T8s (14x2)	28	2,151	$129	1,295	$78
Curling rink - Metal Halides	4	2,509	$151	2,509	$151
Curling rink - Convert Incandescents to Compact Fluorescents	4	627	$38	176	$11
Dressing rooms - Convert 4' T12s to 4' T8s (15x2)	30	2,470	$148	1,487	$89
Rifle range - Convert 4' T12s to 4' T8s (9x2)	18	85	$5	51	$3
Rifle range - Convert 8' T12s to 8' T8s (2x2)	4	45	$3	21	$1
Bowling - Convert 4' T12s to 4' T8s (30x1)	30	1,729	$104	1,041	$62
Bowling - Convert 8' T12s to 8' T8s (8x1)	8	1,091	$66	517	$31
Outside pool lights - Mercury Vapor Lights - Install Timer	10	13,140	$789	6,570	$394
Exit LEDs	10	262,800	$15,779	262,800	$15,779
Parking Lot Controllers	2	1,440	$86	720	$43
TOTALS		**324,549**	**19,486**	**308,798**	**18,540**

Annual Energy Savings (kWh)	**15,751**
Annual Cost Savings	**$946**
Percent Annual Energy Savings	**5%**

These calculations are assuming that hockey rink is occupied 1680 hours/year, the curling rink 1568 hours/year, the rifle range 96 hours/year, the bowling alley 1176 hours/year and the outside pool lights are on 4380 hours/year

The exit lights are assumed to be on 24/7.

Table B.9.4 (a) Window and Door Replacement Calculations for Community Centre

Description	Existing				New			Savings	
	Area (ft^2)	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	R-Value ($^oF\ ft^2hr/BTU$)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Replace wood doors from lounge to hockey rink with insulated wood doors (4)	84	1.578	1,352	$81	6.67	316	$19	1036	$62
Replace windows from hockey lounge to rink with triple pane windows-44"x44" (17)	229	2.000	2,902	$174	6.25	918	$55	1983	$119
Replace windows from curling lounge to rink with triple pane windows - 5'x6' (8)	240	2.000	1,434	$86	6.25	454	$27	980	$59
Replace lounge entrance windows with triple pane windows 6'x9' (2)	108	2.000	1,371	$82	6.25	434	$26	937	$56
Replace lounge entrance windows with triple pane windows - 6'x4' (2)	48	2.000	609	$37	6.25	193	$12	417	$25
TOTALS			**7,668**	**$460**		**2,315**	**$139**	**5,352**	**$321**

Table B.9.4 (b) Window and Door Infiltration Calculations for Community Centre

Description	Crack Length (ft)	Crack Width (in)	Leakage on typical door (cfm)	Leakage on these doors (cfm)	Annual Heat Loss (BTU)	Annual Heat Loss (kWh)	Cost
Glass doors to lounge, 3'x7' (4)	5	0.05	125	17	1,580,475	463	$28
Metal doors from hockey lounge to outside, 3'x7' (2)	10	0.05	125	34	3,160,950	926	$56
Pedestrian doors from ice plant room to outside, 3'x7' (2)	10	0.05	125	34	3,160,950	926	$56
Vehicle door to curling rink, 12'x11' (1)	11.5	0.05	125	39	6,225,356	1,824	$83
Pedestrian door to curling rink, 3'x7' (1)	5	0.05	125	17	2,706,677	793	$36
Pedestrian doors to hockey rink, 3'x7' (2)	10	0.05	125	34	1,161,977	341	$16
Windows from hockey lounge to rink, 44"x44" (17)	62	0.025	50	85	7,881,302	2,310	$139
Windows from curling lounge to rink, 5'x6' (8)	44	0.025	50	60	2,617,702	767	$46
Lounge entrance windows, 6'x9' (2)	15	0.025	50	20	1,896,570	556	$33
Lounge entrance windows, 6'x4' (2)	10	0.025	50	14	1,264,380	371	$22
TOTALS						**9,278**	**$515**

Table B.9.4 (c) Wall/Roof Insulation Upgrade for Community Centre

Description	Existing				New			Savings	
	Area (ft^2)	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	R-Value (^oF ft^2hr/BTU)	Annual Heat Loss (kWh)	Cost	Energy (kWh)	Cost
Upgrade insulation on east and west walls of curling rink	6600	2.000	114,796	$5,246	20	14,193	$649	100,603	$4,598
TOTALS			**114,796**	**$5,246**		**14,193**	**$649**	**100,603**	**$4,598**

The temperature of the lounges and ice plant is assumed to be 70 F

The temperature of the curling rink is assumed to be 46 F

The temperature of the hockey rink is assumed to be -13 F

The crack length of the doors and windows is a quarter of the perimeter

Table B.9.5 - Water Usage for the Community Centre

	Qty	Est. # of Uses/Hr/ Fixture	Est. # of Uses/Yr	Current Flow (LPF or LPC)	Current Water Usage (L/Yr)	New Flow (LPF or LPC)	New Water Usage (L/Yr)	Water Saved (L/Yr)	Hot Water Savings (kWh)	Cost Savings
Hockey Lounge Washroom										
Sinks	5	4.0	33,833	0.32	10,827	0.32	10,827	0	0	$0
Toilets	5	1.8	15,474	6.00	92,842	6.00	92,842	0	NA	NA
Urinals	2	7.5	25,200	3.80	95,760	3.80	95,760	0	NA	NA
Curling Lounge Washroom										
Sinks	5	4.0	33,833	1.6	54,133	0.32	10,827	43,307	1,623	$74
Toilets	5	1.8	15,474	13.3	205,026	6.00	92,842	112,184	NA	NA
Urinals	2	7.5	25,200	9.5	239,400	3.80	95,760	143,640	NA	NA
Dressing Rooms										
Sinks	5	4.0	33,833	1.6	54,133	0.32	10,827	43,307	1,623	$74
Toilets	5	1.8	15,474	13.3	205,026	6.00	92,842	112,184	NA	NA
Showers	5	0.72	6,048	66.25	400,680	47.32	286,191	114,489	4,290	$196
Pool Change Rooms										
Sinks	3	4.0	20,300	0.32	6,496	0.32	6,496	0	0	$0
Toilets	4	1.8	12,379	13.3	164,021	6	74,274	89,747	NA	NA
Urinals	1	7.5	12,600	3.80	47,880	3.8	47,880	0	NA	NA
Shower	2	0.72	2,419	47.32	114,477	47.32	114,477	0	0	$0
TOTALS					**1,690,702**		**1,031,844**		**7,536**	**$344**

Frequency at Which Fixtures are Used			
	Females	**Males**	**Totals**
Number of People	60	100	
Number of Toilet Uses/day	3	1	
Number of Toilets	19	19	
Toilet Uses/hour/fixture	1.2	0.7	1.8
Number of Urinal Uses/day	0.0	3.0	
Number of Urinals	5.0	5.0	
Urinal Uses/hour/fixture	0.0	7.5	7.5
Number of Sinks	18	18	
Number of Sink Uses/day	3	4	
Sink Uses/hr/fixture	1.3	2.8	4.0

Current Hot Water Usage (kWh)		
Fixture	**L/Yr**	**kWh**
Sinks	125,589	4,706
Showers	515,157	19,305
Total		**24,011**

Notes on Water Usage for Community Centre:

The high flow sinks are assumed to consume 2.5 gpm and the low flow sinks are 0.5 gpm

The high flow toilets are assumed to use 3.5 gallons per flush and the low flow toilets use 1.5 gallons per flush

The high flow urinals are assumed to consume 2.5 gpm and the low flow urinals consume 1 gpm

The high flow showers consume 2.5 gpm and the low flow showers are 1 gpm (shower lengths are 5 minutes)

Table B.9.6 Energy Savings with Heating, Ventilating, and Air Conditioning for Community Centre

Description	Quantity	Flow Rate (cfm)	Energy Savings (kWh)
Install motorized damper	1	20	1,627

Description	Quantity	Current Efficiency	New Efficiency	Energy Savings (kWh)
Replace furnace in dressing room with high efficiency furnace	1	80%	95%	14,250
Replace unit heaters in curling rink with high efficiency furnaces	1	75%	95%	32,000

Description	Current Heat Loss From Pool (kWh)	Percent Energy Savings	Energy Savings (kWh)
Use Tropical Fish as a liquid solar blanket for the pool.	165,000	40%	66,000

Table B.9.7 Energy Consumption and Savings Calculations for Motors in Community Centre

Description	HP	Required HP	# of hours	Current Motors			Energy Savings of Premium Efficiency Versus Standard Efficiency Motor		
				Actual HP	KW	KWH	Actual HP	KW	KWH
Compressor - Hockey Rink	40	32	720	32.6	24.34	17,525	0.96	0.72	515
Compressor - Curling Rink	50	40	1,260	40.8	30.42	38,335	1.20	0.89	1,127
Brine Pump 1	20	16	960	17.8	13.24	12,714	0.48	0.36	344
Brine Pump 2	20	16	1,680	17.8	13.24	22,249	0.48	0.36	601
Condenser fan 1	10	8	720	8.2	6.08	4,381	0.24	0.18	129
Condenser fan 2	10	8	720	8.2	6.08	4,381	0.24	0.18	129
Condenser fan 3	8	6	720	6.7	4.97	3,576	0.18	0.13	97
Pool Pump	15	12	900	12.2	9.13	8,215	0.36	0.27	242
TOTAL						**111,375**			**3,184**

APPENDIX C

WATER EFFICIENCY

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Leaks

- A leak of one drop per second wastes 10,000 litres of water per year. A toilet that runs after a flush can waste 200,000 litres of water per year. Fixing a hot water leak will save energy as well as water.

- Check for differing water meter readings at bedtime and in the morning. If no water has been intentionally used, a difference in meter readings indicates a leak.
- If a few drops of food colouring put in your toilet tank seep into the toilet bowl (without flushing), check the flapper valve, valve seat and flapper lift chain for the source of the leak.
- Conduct a periodic "leak check" a minimum of twice a year on water using fixtures and appliances, including outside hose connections. Replace worn washers, O-rings and faulty fixtures.

On-Site Wastewater Systems

- Wise water management is necessary. All septic systems have limitations and water conservation should be practiced.
- Do not use substitutes for toilet paper. These products may not decompose in the tank and could clog the system.
- Perform regular maintenance checks on your entire system, including regular pump outs of the septic tank and inspection of the disposal field for signs of saturation or leakage.

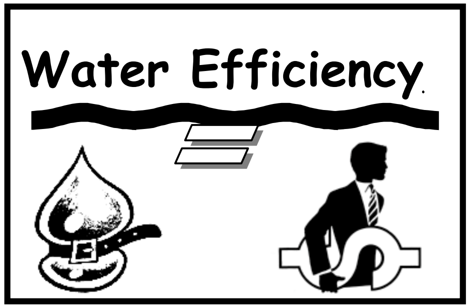
For More Information, Please Contact:

Water Efficiency Coordinator
Pollution Prevention
Manitoba Conservation
123 Main Street, Suite 160
Winnipeg MB R3C 1A5

Phone: (204) 945-8980 or
1-800-282-8069 ext. 8980
Fax: (204) 945-1211
E-mail: lliebgott@gov.mb.ca

Publication Number: 98-06E

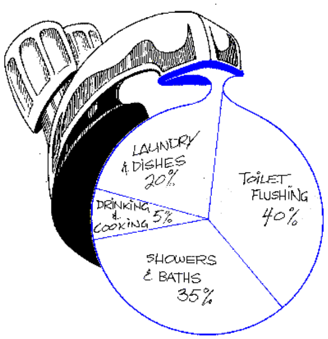
Pollution Prevention
Manitoba Conservation



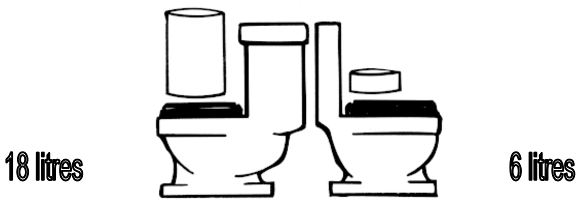
Water Use

How you can reduce yours!

- Save money.
- Delay the need to expand our water and wastewater treatment plants.
- Prolong the life of in-ground sewage disposal systems, i.e., septic fields.
- Protect our water sources.



Bathroom



- Replace toilets that flush 13 to 26 litres of water with 6 litre or dual flush toilets, cutting water used by toilets by half or more. See www.cwwa.ca for toilet performance ratings. In the mean time, reduce water per flush in toilets by up to 35% by installing early closure devices (don't use bricks – as they break down, pieces interfere with the flapper seal).

- Refrain from using the toilet to dispose of trash.

- A partially filled tub uses less water than a long shower; a short shower uses less than a full tub.

- Replace your 20 litre per minute showerhead with a low-flow 9.5 litre per minute showerhead. You'll use less than half the water.

- Make it a habit to be finished your shower in less than 5 minutes.

- Install a water conserving 3.5 litre per minute aerator on your bathroom tap.

- When shaving, rinse the razor in a cup or a partially filled sink instead of letting the tap run.

- Brush teeth using a glass of water to rinse.

Kitchen & Laundry

- Install a water saving 9 litre per minute aerator on the kitchen tap.

- Rinse dishes in a stoppered sink or basin, not with running water.

- Wash vegetables in a basin or stoppered sink, then quickly rinse using running water.

- Keep drinking water in the fridge. Wash the container and change the water every few days.

- Thaw food in the fridge rather than under a running tap. This conserves both energy and water.

- Compost organic wastes instead of using a sink garbage disposal.

- Buy a low water use dishwasher to save on energy, water and detergent costs.

- Wash only full loads of laundry and dishes.

- Front loading washing machines use less water than top-loading washers do. If unavailable, choose a clothes washer with a suds saver, and water saving cycle.

General Water Use

- Only use water treatment or softening systems, if required. If possible, only use softened water for bathing and cleaning – use unsoftened water for cooking, drinking and watering plants.

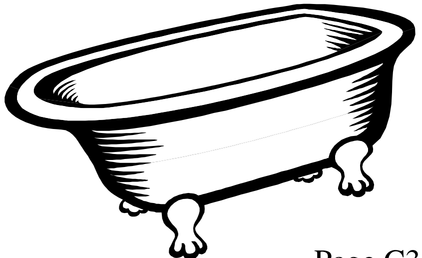
- Ensure a water softener regenerates only when the resin is exhausted.

- Turn the system off if you will be away for more than a few days.

- Insulate hot water tank and pipes to reduce the need to run water until it is hot. Install a heat trap on the pipe above your water heater to save energy and water.

- Know location of sink, toilet and main shut off valves in case a pipe or water heater blows, or so you can turn off your water when you are away.

- If your water pipes tend to freeze, do not let the tap run continuously. This wastes water, and overloads sewer systems. Instead, install heat tape or connect a pump-back reservoir system (discuss options with your plumber, electrician or call Manitoba Conservation).



APPENDIX D

INCENTIVE PROGRAMS

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Table D.1 Manitoba Hydro Power Smart Incentives

Item	Incentives	Contacts
Compact Fluorescents	$5 - Non-reflectorized screw in lamp, $10 - Reflectorized screw-in lamp, $45 - New hard wired fixture	Cheryl Pilek at cdpilek@hydro.mb.ca or 204-474-3615
T8 Electronic Fluorescents	T8 Premium Ballast - $20, T8 Standard Ballast - $15, T8 Dimmable Ballast - $60, 8 Foot T8 Ballast - $35	Cheryl Pilek at cdpilek@hydro.mb.ca or 204-474-3615
LED Exit Signs	$45 per new sign	Cheryl Pilek at cdpilek@hydro.mb.ca or 204-474-3615
High Pressure Sodium Lighting	The lesser of $500 per kilowatt saved or $100 of lighting fixture cost	Cheryl Pilek at cdpilek@hydro.mb.ca or 204-474-3615
Parking Lot Controllers	$25 for each controlled circuit	May Arason-Li at marasonli@hydro.mb.ca or 204-474-7813
Air Barrier System	$0.46 per square foot or $5 per square meter of net wall area	May Arason-Li at marasonli@hydro.mb.ca or 204-474-7813
Windows	Depends on replacement window's U-Value and net window area	May Arason-Li at marasonli@hydro.mb.ca or 204-474-7813
Geothermal Heat Pump	Manitoba Hydro will pay up to half the cost of a feasabillity study to help decide whether a geothermal heat pump is the right choice for you building. Manitoba Hydro also offers a custom incentive towards the capital cost of your heat pump system, based on the energy savings calculated in the feasability study.	Domenic Marinelli at dmarinelli@hydro.mb.ca or 204-474-4273

Notes

For general information and information kits contact:
Power Smart for Business
Phone: 474-3676
Email Address: powersmartforbusiness@hydro.mb.ca

Table D.2. Other Incentive Programs

Program Name	Eligibility	What Type of Projects are Available	Ref. Page	Available Funding	Funding Maximums	Deadline For Applications	Prospect of Funding	Project Sponsor	Contact	Email	Website
Energy Innovators Initiative: Energy Retrofit Assistance (ERA)	Comm. & Institutional Bldgs. Aboriginal, northern, rural or remote communities may receive special consideration.	Projects that reduce energy consumption. Includes costs for project planning and development, materials and labour, monitoring and tracking and staffing training and awareness.	13	$7.50/GJ (277.8 kW H)	up to 25% of costs based on energy savings ($250,000 max)	On-going	Good	NRCan	MarieLynn Tremblay	Marie_Lyne.Tremblay@nrcan-rncan.gc.ca	http://oee.nrcan.gc.ca/commercial/financial-assistance/existing/retrofits/implementation.cfm?attr=0
Municipal Rural Infrastructure Fund (MRIF)	All MB local governments	Projects that construct, restore or improve infrastructure that ensures sustainable use and management of water and wastewater resources. Projects that construct, restore or improve public arts and heritage infrastructure, such as museums, heritage sites, sites for performings arts, and cultural or community centres. - See detailed program info for more info. Program has many requirements and caveats.	23, 46, 54		2/3 of the approved costs	On-going	Good	Canada-Manitoba Infrastructure Programs		infra@gov.mb.ca	http://www.infrastructure.mb.ca/e/index.html
Renewable Energy Development Initiative (REDI)	…Municipalities…, solar air/water heating, biomass	Projects involving solar air or water heating and clean burning biomass combustion projects.	25	25% of purchase and install of qualifying system	$80,000	31-Mar-07		NRCan		redi.penser@nrcan.gc.ca	http://www2.nrcan.gc.ca/es/erb/erb/english/View.asp?x=455
Community Places Program	Non-profit community organizations in MB, except public schools, universities, hospitals, nursing homes, monnercial coops, federal, provincial and city of Winnipeg departments.	Projects involving the upgrading, construction or acquisition of community facilities available to the general community. Priority given to proposals for critical repairs to extend the life of existing well-used facilities. Projects must provide lasting, long-term benefits to the community.		Up to 50% of first $15,000 and 1/3 of the rest of project	$50,000			Manitoba Culture, Heritage and Tourism	Varies by region	www.gov.mb.ca/chc/grants	http://www.gov.mb.ca/chc/grants
Sustainable Development Innovations Fund (SDIF)	Municipal corporations, local governments, private and non-profit organizations and businesses	Sustainable community development, Eco-efficiency initiatives, environmental stewardship. Emphasis on youth involvement, first nations and northern communities.	55		$50,000 (usually $25,000 or less)		fair	Manitoba Conservation		sdif@gov.mb.ca	http://www.gov.mb.ca/conservation/pollutionprevention/sdif/index.html

APPENDIX E

TRANSPORTATION AND EQUIPMENT EFFICIENCY

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Transportation and Equipment Efficiency for Small Municipalities (< 10,000 population).

Municipal governments may wish to:

- Assess Regulatory, Standards & Industry "Best Practices" to ensure compliance and demonstrated "Due Diligence". Includes Provincial, Federal, Society of Automotive Engineers (SAE), Canadian Standards Association (CSA), American National Standards Institute (ANSI), Workplace Safety & Health audits, Safety inspections, Workplace Hazardous Materials Information System (WHMIS), Transportation of Dangerous Goods regulation (TDG), etc.

- Review current fuelling habits & education on "economical operation" (Driver training, minimal idling, proper lubricants for seasonal operation etc.)

- Review "Alternative Fuel" options, e.g., Diesel and Biodiesel, Propane, Compressed Natural Gas (CNG). Note: Electric Vehicles are not an option yet due to initial cost and the prevailing ambient temperatures experienced in Manitoba

- Consider recycling initiatives for disposal of Fleet Waste Stream products, eg. tires, lubricating oil, anti-freeze, aerosol cans, paints, controlled products, ferrous & non-ferrous scrap metal, plastics etc.

Other Opportunities:

Transportation Demand Management

- Education & awareness programs on ride-sharing, telecommuting & teleconferencing

Encouragement of Alternative Modes of Transportation

- Possibility of van based transit or "pool" operations for commuting within towns & outlying areas. May be viable for transporting groups of employees to & from work locations

- Provision of bike racks, lockable bike containers or small fenced compounds at key locations

- Education & awareness programs on vehicle emissions, "fuel saving" driving habits etc.

Traffic & Parking Management

- Possibility of synchronizing traffic lights (if installed) and implementing parking fees etc. to manage parking

CHOOSING A VEHICLE

Vehicle Construction

The following points are important when considering fuel efficiency.

- A five speed manual transmission is about 5% more efficient than an automatic.
- Smaller engines use less fuel.
- Front wheel drive vehicles are lighter and therefore more fuel efficient than rear wheel drive vehicles
- SUV's tend to have low fuel efficiency
- Front wheel drive vehicles provide better traction than rear wheel drive in most cases.
- Small engines with a turbocharger can help make up the power difference between large and small engines by using energy from hot exhaust.

Vehicle Ratings

The Office of Energy Efficiency of Natural Resources Canada, issues a list of the most fuel efficient vehicles in each of a number of categories. See their website for the latest list.

Extra Features

Air conditioning, power steering, and roof racks are some of the big energy using extras. Air conditioning can increase your fuel consumption by 10 to 20 percent in city driving. A fully loaded roof rack can add 25% to your fuel costs. Even empty, it will add about 1% due to wind resistance

DRIVING ECONOMICALLY

Driving technique is critical to fuel economy.

- Maintain recommended tire pressure to maximize fuel efficiency and tire life.
- Keep your engine well tuned and maintained.
- One minute of idling uses more fuel than restarting the engine.
- Avoid jack-rabbit starts.
- An open sun roof and open windows increase air resistance, especially on the highway. Use the car's ventilation system instead.
- Most cars use 10% less fuel when driven at 55 miles per hour as opposed to 62, or 90 kilometers as opposed to 100.
- Adjust your speed in advance of changes in traffic flow. Take your foot off the accelerator and progressively gear down rather than accelerating up to a stop sign and breaking hard.

ENGINE BLOCK HEATERS - IS THERE A SAVINGS?

- In sub-freezing temperatures, the first 15 to 20 minutes of driving, after a cold start cause the engine to use about 30% more fuel than a warm engine.
- A timer can be installed for your vehicle's block heater to start warming the engine a couple hours before you head out.
-

- With the cost of electricity accounted for, you should still come out ahead, over the course of a winter.

FUEL OPTIONS

- Diesel engines are more fuel efficient than gasoline engines, as Diesel contains 10% more energy per unit volume than gasoline. Higher diesel engine costs are offset by increased fuel economy and engine life.
- Many fleet operators are converting their vehicles to biodiesel for cost advantages and a cleaner burn.
- There are many advantages to a dual-fuel system, which allows you to switch between gasoline and propane or natural gas with the flick of a switch.
- Hybrid vehicles…

From the Office of Energy Efficiency, Natural Resources Canada:

Buying a Fuel-Efficient Vehicle

- Fuel consumption can vary widely from one vehicle to the next. Whether you're buying new or used, the choices you make today will either save you money (through reduced fuel consumption) or cost you money for years to come.

- How big is big enough? It's always a good idea to avoid buying more vehicle than you need. Larger vehicles tend to be heavier and have bigger and more powerful engines, so consider buying the most fuel-efficient vehicle that meets your everyday needs.

- If you're buying a new vehicle, check the EnerGuide label for its fuel consumption rating. EnerGuide labels are now affixed to all new light-duty vehicles sold in Canada.

- Fuel consumption ratings for all new cars, light-duty trucks and vans sold in Canada are also available in the free Fuel Consumption Guide. You can download a PDF version of the Guide, or call 1 800 387-2000 to order your free copy. Past editions are available, so you can also check fuel consumption ratings for used vehicles.

- Have a look at the list of the most recent winners of the EnerGuide Awards, presented each model year to the manufacturers of the most fuel-efficient vehicles in different classes – two-seater, subcompact, compact, mid-sized and large cars, as well as station wagons, vans, pickup trucks and special purpose vehicles.

- Your choice of transmission will directly affect the cost of the vehicle and its fuel consumption. As a general rule, a manual transmission is more fuel efficient than an automatic, assuming you shift properly. If you buy an automatic, the more gears, the better.

- Four-wheel drive and all-wheel drive offer superior traction and braking under slippery conditions, but the weight and friction of additional drivetrain parts can increase fuel consumption by 5 to 10 percent compared with two-wheel drive vehicles. How often would you need to use this option, and is it worth the extra fuel cost for as long as you own the vehicle?

- Under normal driving conditions, smaller engines deliver better fuel economy than larger engines. Choose the smallest engine that meets your everyday needs.

- Are you willing to pay a fuel penalty for as long as you own your vehicle just to have the convenience of options such as power windows, seats and mirrors? Many options increase fuel consumption by adding weight, increasing aerodynamic drag, or drawing extra power from the engine.

- Do you really need an air conditioner? Operating an air conditioner in hot weather can increase fuel consumption by more than 20 percent in city driving. Consider using the car's ventilation system and options such as a sunroof and tinted glass.

- For most drivers, cruise control saves fuel on the highway by keeping your speed constant and avoiding inadvertent speeding.

- Explore your fuel options. Will a fuel-efficient diesel vehicle meet your needs? What about propane or natural gas, which produce fewer greenhouse gas emissions and are cheaper to use than gasoline or diesel fuel? Ethanol fuel blends are also widely used by Canadian motorists. And hybrid vehicles, which use a combination of high-power batteries and an internal combustion engine, are beginning to appear on the North American market.

Please note – this list of websites is not comprehensive. They have not been reviewed for accuracy, but may provide ideas and options appropriate for some municipalities.

Other vehicle and equipment information can be found on the Internet at:
http://oee.nrcan.gc.ca/publications/infosource/home/index.cfm?act=category&PrintView=N&Text=N

http://www.betterroads.com/articles/NewProds/oct05bid.htm

http://www.edmunds.com/advice/specialreports/articles/102946/article.html

http://www.betterroads.com/articles/NewProds/oct05bid.htm

http://snow.grounds-mag.com/ar/grounds_maintenance_september_2/

http://www.missoulian.com/articles/2003/11/15/news/local/news03.txt

http://rocktoroad.com/grader.html

http://news.thomasnet.com/fullstory/29180/3281

http://www.forester.net/gx_0501_graders.html

http://www.epa.gov/greenkit/quick_start.htm#greenfleet

Self Audit

Municipal Operations -Efficiency Survey

(Transportation, Road Repair, Snow Clearance, Waste Disposal, etc.)

Name of Organisation: ___________________________
Address: ___________________________
____
____
Contact Name: ___________________________
Phone No. _____________
Name of person completing form: _____________________________
Date: ______________________

Vehicles and Construction Equipment						
	Gasoline	**Diesel**	**CNG**	**Propane**	**Other**	**Total**
Total Fuel Usage L/Year						
Greenhouse Gas Emissions (tonnes)						

Fuel Use Minimization Considerations

☐ What type of vehicles/equipment, if any, are you planning to replace in the next few years?__________________________________
____
____

☐ Can you downsize these vehicles/equipment?
Comments:____
____
____

☐ Can you make process or other changes to minimize use of, or eliminate these vehicles/equipment? Comments:________________
____
____

☐ Do you have a policy in place to make fuel efficiency one of the vehicle/equipment purchase requirements? Yes ___ No ___

☐ Have you made operational changes such as reducing idling time of vehicles and equipment, and using block heaters and timers to reduce warm up time?
Yes ___ No ___

☐ Have you encouraged more energy efficient driving behaviour through training, policies, and ongoing reminders? Yes ___ No ___

☐ Do you have procedures in place to detect and rectify leakage of above-ground and under-ground fuel storage tanks? Yes __ No ___

☐ Do you use automatic shut-off fill nozzles at pumps? Yes ___ No ___

Comments

APPENDIX F

ENERGY CONSUMPTION MONITORING SPREADSHEETS AND GRAPHS

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Table F.1 - Energy Consumption Monitoring Data for the Office Building

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September	5,160	0	5,160	155.4	5,160			0		#DIV/0!			0		#DIV/0!
October	1,560	69	2,274	417.6	2,274			0		#DIV/0!			0		#DIV/0!
November	3,240	256	5,890	577.8	5,890			0		#DIV/0!			0		#DIV/0!
December	2,640	459	7,391	977.5	7,391			0		#DIV/0!			0		#DIV/0!
January	3,480	858	12,360	1166	12,360			0		#DIV/0!			0		#DIV/0!
February	3,000	932	12,646	888.6	12,646			0		#DIV/0!			0		#DIV/0!
March	2,700	589	8,796	802.5	8,796			0		#DIV/0!			0		#DIV/0!
April	2,460	311	5,679	345.4	5,679			0		#DIV/0!			0		#DIV/0!
May	1,980	195	3,998	270	3,998			0		#DIV/0!			0		#DIV/0!
June	3,360	193	5,357	70.8	5,357			0		#DIV/0!			0		#DIV/0!
July	1,260	52	1,798	34.1	1,798			0		#DIV/0!			0		#DIV/0!
August	6,420	8	6,503	70.9	6,503			0		#DIV/0!			0		#DIV/0!
TOTAL	37,260	3,922	77,852	5777	77,852	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Brandon, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=CA&StationID=3471&Year=2005&Month=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F20) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.1 - Energy Consumption Monitoring Graph for Carberry's Office Building

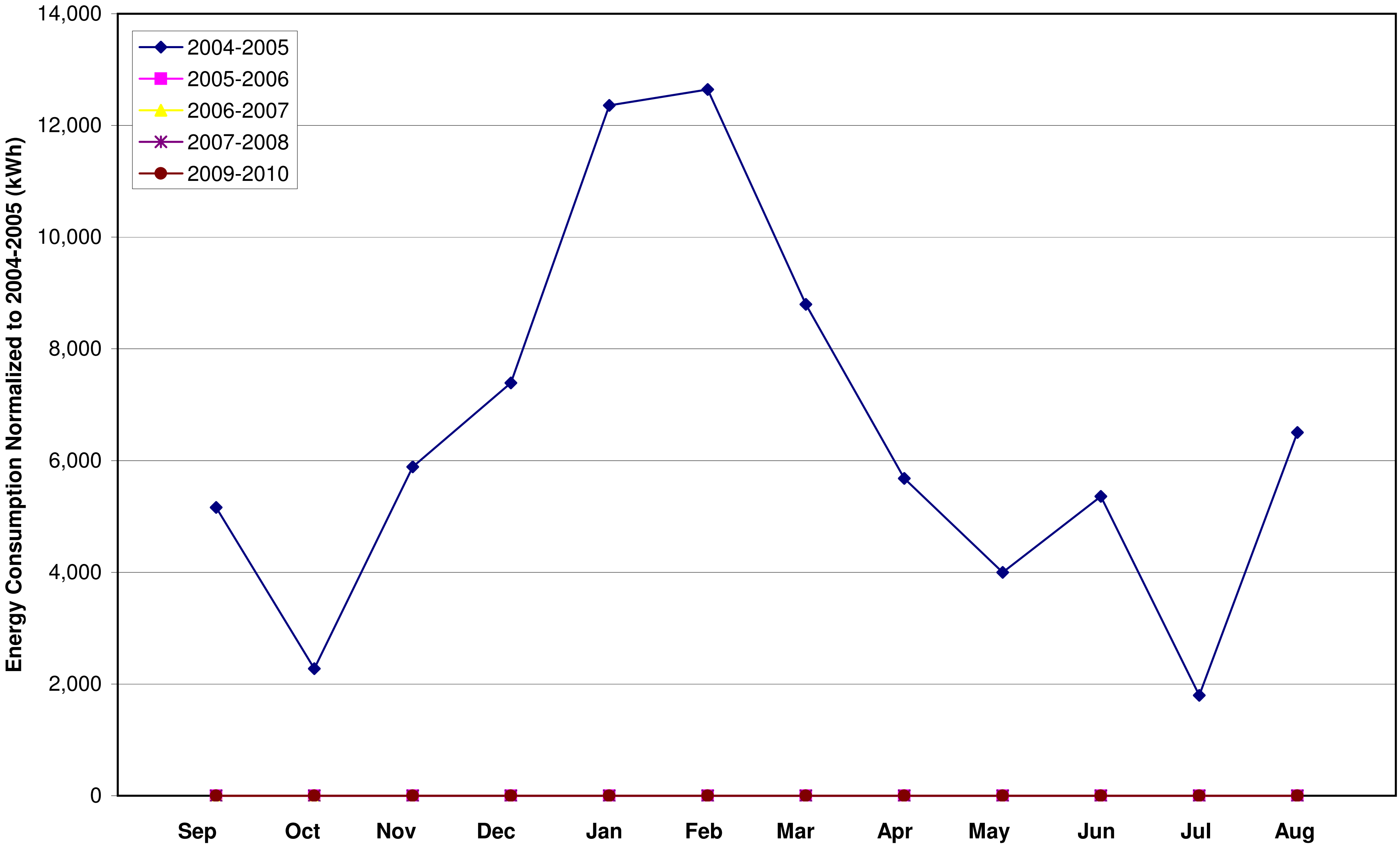


Table F.2 - Energy Consumption Monitoring Data for the Old Office Building

	2004-2005					2005-2006					2006-2007				
Month	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)
September	2,080	217	4,326	155.4	4,326			0		#DIV/0!			0		#DIV/0!
October	970	600	7,180	417.6	7,180			0		#DIV/0!			0		#DIV/0!
November	1,200	429	5,640	577.8	5,640			0		#DIV/0!			0		#DIV/0!
December	1,290	1,293	14,672	977.5	14,672			0		#DIV/0!			0		#DIV/0!
January	1,250	1,744	19,300	1166	19,300			0		#DIV/0!			0		#DIV/0!
February	1,760	2,057	23,049	888.6	23,049			0		#DIV/0!			0		#DIV/0!
March	1,020	1,268	14,143	802.5	14,143			0		#DIV/0!			0		#DIV/0!
April	1,240	1,265	14,332	345.4	14,332			0		#DIV/0!			0		#DIV/0!
May	1,020	564	6,857	270	6,857			0		#DIV/0!			0		#DIV/0!
June	990	248	3,557	70.8	3,557			0		#DIV/0!			0		#DIV/0!
July	1,510	28	1,800	34.1	1,800			0		#DIV/0!			0		#DIV/0!
August	3,690	132	5,056	70.9	5,056			0		#DIV/0!			0		#DIV/0!
TOTAL	18,020	9,845	119,913	5777	119,913	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Brandon, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=CA&StationID=3471&Year=2005&Month=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F20) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.2 - Energy Consumption Monitoring Graph for Carberry's Old Office Building

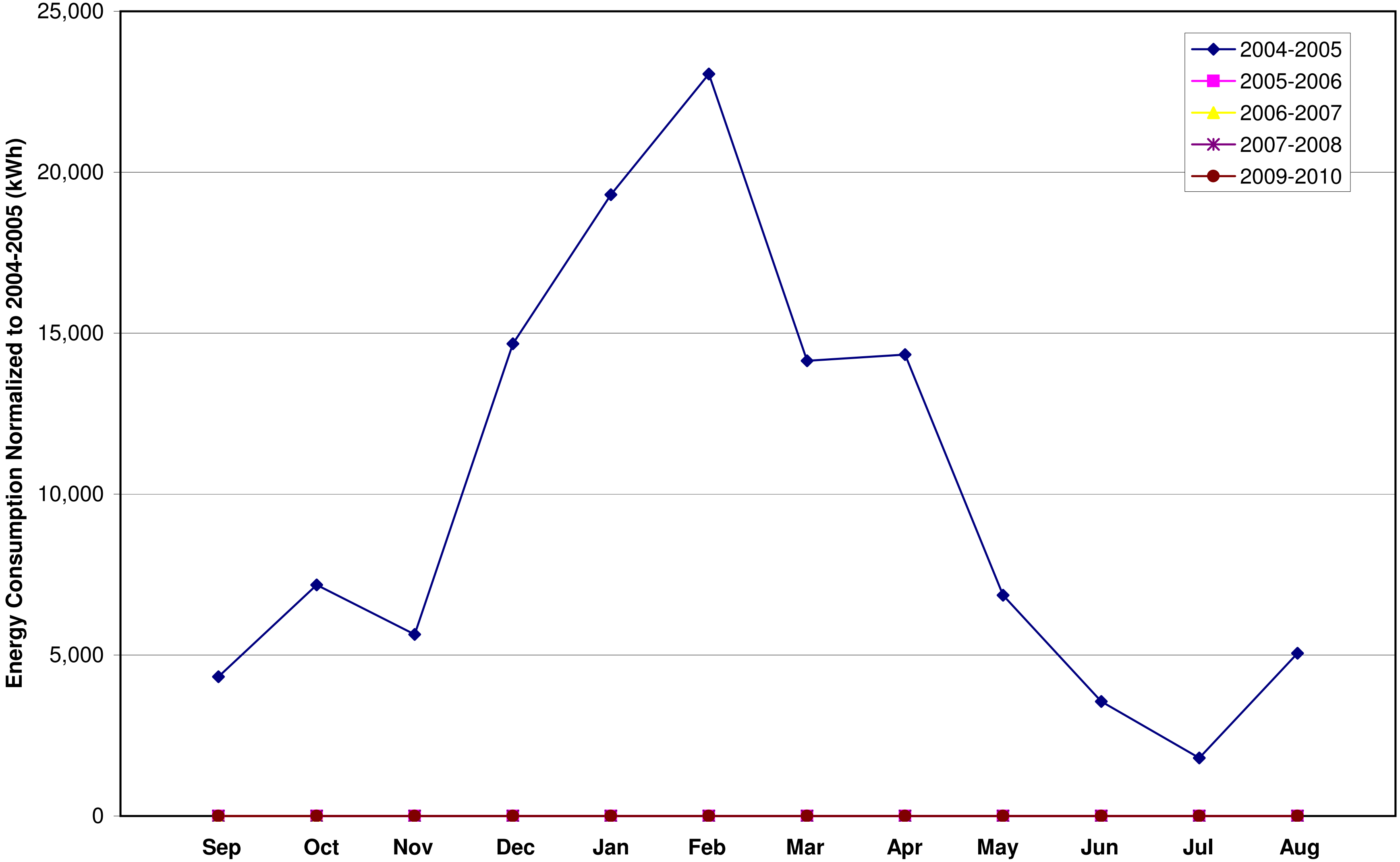


Table F.3 - Energy Consumption Monitoring Data for the Town Shop

	2004-2005					2005-2006					2006-2007				
Month	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)
September	860	47	1,346	155.4	1,346			0		#DIV/0!			0		#DIV/0!
October	0	305	3,157	417.6	3,157			0		#DIV/0!			0		#DIV/0!
November	1,139	657	7,939	577.8	7,939			0		#DIV/0!			0		#DIV/0!
December	0	1,686	17,450	977.5	17,450			0		#DIV/0!			0		#DIV/0!
January	2,272	3,410	37,564	1166	37,564			0		#DIV/0!			0		#DIV/0!
February	0	1,944	20,120	888.6	20,120			0		#DIV/0!			0		#DIV/0!
March	1,786	1,474	17,041	802.5	17,041			0		#DIV/0!			0		#DIV/0!
April	0	748	7,742	345.4	7,742			0		#DIV/0!			0		#DIV/0!
May	863	308	4,051	270	4,051			0		#DIV/0!			0		#DIV/0!
June	292	0	292	70.8	292			0		#DIV/0!			0		#DIV/0!
July	350	162	2,027	34.1	2,027			0		#DIV/0!			0		#DIV/0!
August	327	116	1,528	70.9	1,528			0		#DIV/0!			0		#DIV/0!
TOTAL	7,889	10,857	120,256	5777	120,256	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Brandon, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=CA&StationID=3471&Year=2005&Month=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F20) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.3 - Energy Consumption Monitoring Graph for Carberry's Town Shop

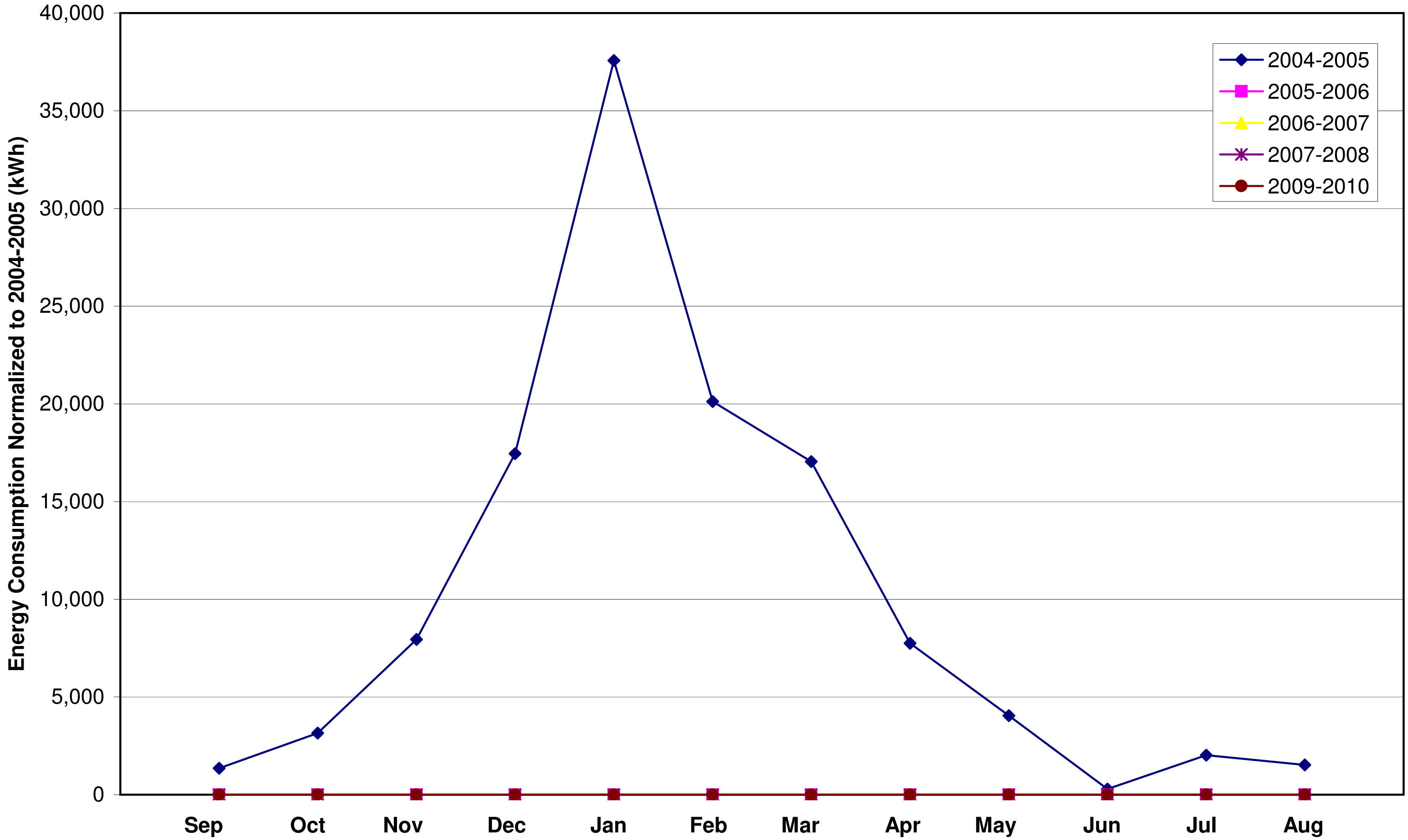


Table F.4 - Energy Consumption Monitoring Data for the Community Hall

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September	1,081	223	3,389	155.4	3,389			0		#DIV/0!			0		#DIV/0!
October	1,501	490	6,572	417.6	6,572			0		#DIV/0!			0		#DIV/0!
November	2,401	886	11,571	577.8	11,571			0		#DIV/0!			0		#DIV/0!
December	2,161	1,590	18,617	977.5	18,617			0		#DIV/0!			0		#DIV/0!
January	2,341	3,058	33,990	1166	33,990			0		#DIV/0!			0		#DIV/0!
February	1,801	3,176	34,672	888.6	34,672			0		#DIV/0!			0		#DIV/0!
March	1,801	2,123	23,773	802.5	23,773			0		#DIV/0!			0		#DIV/0!
April	481	2,659	28,001	345.4	28,001			0		#DIV/0!			0		#DIV/0!
May	0	883	9,139	270	9,139			0		#DIV/0!			0		#DIV/0!
June	1,201	374	5,072	70.8	5,072			0		#DIV/0!			0		#DIV/0!
July	0	0	0	34.1	0			0		#DIV/0!			0		#DIV/0!
August	901	162	2,578	70.9	2,578			0		#DIV/0!			0		#DIV/0!
TOTAL	15,670	15,624	177,374	5777	177,374	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Brandon, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=CA&StationID=3471&Year=2005&Month=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F20) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.4 - Energy Consumption Monitoring Graph for Carberry's Community Hall

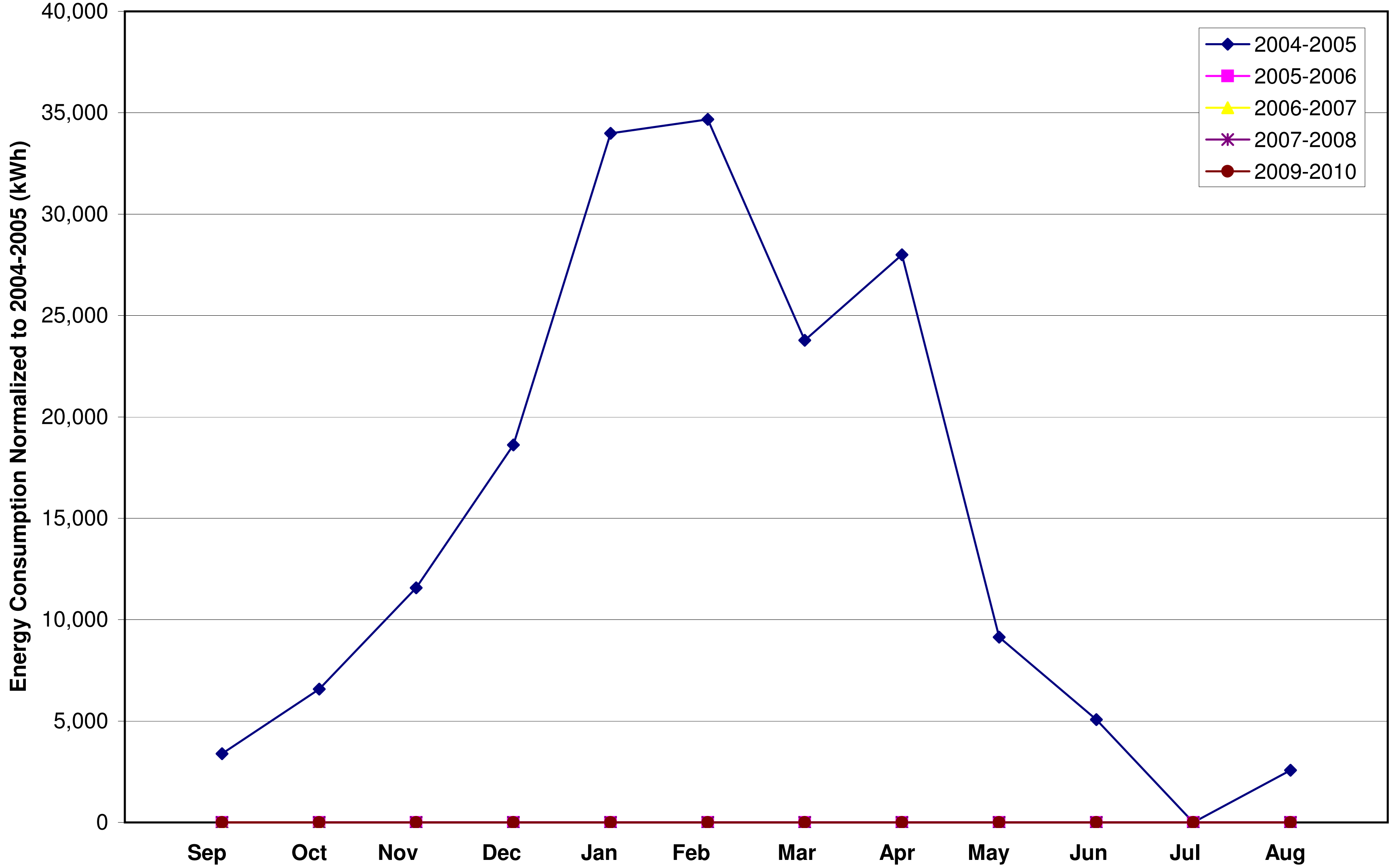


Table F.5 - Energy Consumption Monitoring Data for the Museum and Cultural Centre

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September	1,540	19	1,737	155.4	1,737			0		#DIV/0!			0		#DIV/0!
October	440	149	1,982	417.6	1,982			0		#DIV/0!			0		#DIV/0!
November	710	462	5,492	577.8	5,492			0		#DIV/0!			0		#DIV/0!
December	1,340	674	8,316	977.5	8,316			0		#DIV/0!			0		#DIV/0!
January	2,140	1,284	15,429	1166	15,429			0		#DIV/0!			0		#DIV/0!
February	1,460	770	9,429	888.6	9,429			0		#DIV/0!			0		#DIV/0!
March	570	633	7,121	802.5	7,121			0		#DIV/0!			0		#DIV/0!
April	790	319	4,092	345.4	4,092			0		#DIV/0!			0		#DIV/0!
May	210	179	2,063	270	2,063			0		#DIV/0!			0		#DIV/0!
June	170	19	367	70.8	367			0		#DIV/0!			0		#DIV/0!
July	1,040	58	1,640	34.1	1,640			0		#DIV/0!			0		#DIV/0!
August	460	8	543	70.9	543			0		#DIV/0!			0		#DIV/0!
TOTAL	10,870	4,574	58,210	5777	58,210	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Brandon, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=CA&StationID=3471&Year=2005&Month=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F20) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.5 - Energy Consumption Monitoring Graph for Carberry's Museum & Cultural Centre

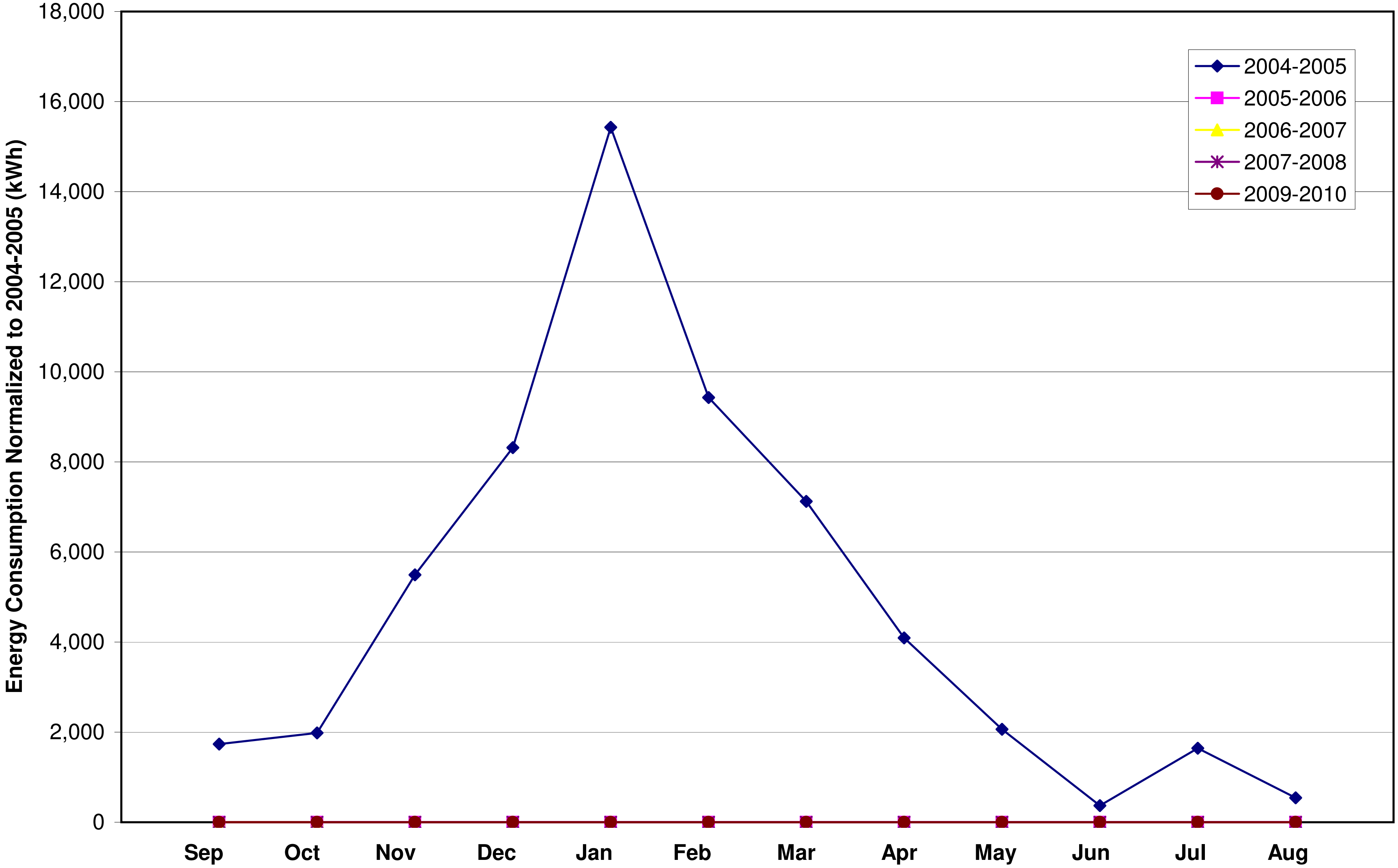


Table F.6 - Energy Consumption Monitoring Data for the Public Washrooms

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September	770	0	770	155.4	770			0		#DIV/0!			0		#DIV/0!
October	590	0	590	417.6	590			0		#DIV/0!			0		#DIV/0!
November	910	0	910	577.8	910			0		#DIV/0!			0		#DIV/0!
December	1,440	0	1,440	977.5	1,440			0		#DIV/0!			0		#DIV/0!
January	1,740	0	1,740	1166	1,740			0		#DIV/0!			0		#DIV/0!
February	2,230	0	2,230	888.6	2,230			0		#DIV/0!			0		#DIV/0!
March	1,300	0	1,300	802.5	1,300			0		#DIV/0!			0		#DIV/0!
April	1,440	0	1,440	345.4	1,440			0		#DIV/0!			0		#DIV/0!
May	820	0	820	270	820			0		#DIV/0!			0		#DIV/0!
June	850	0	850	70.8	850			0		#DIV/0!			0		#DIV/0!
July	390	0	390	34.1	390			0		#DIV/0!			0		#DIV/0!
August	550	0	550	70.9	550			0		#DIV/0!			0		#DIV/0!
TOTAL	13,030	0	13,030	5777	13,030	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Brandon, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=CA&StationID=3471&Year=2005&Month=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F20) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.6 - Energy Consumption Monitoring Graph for Carberry's Public Washroom

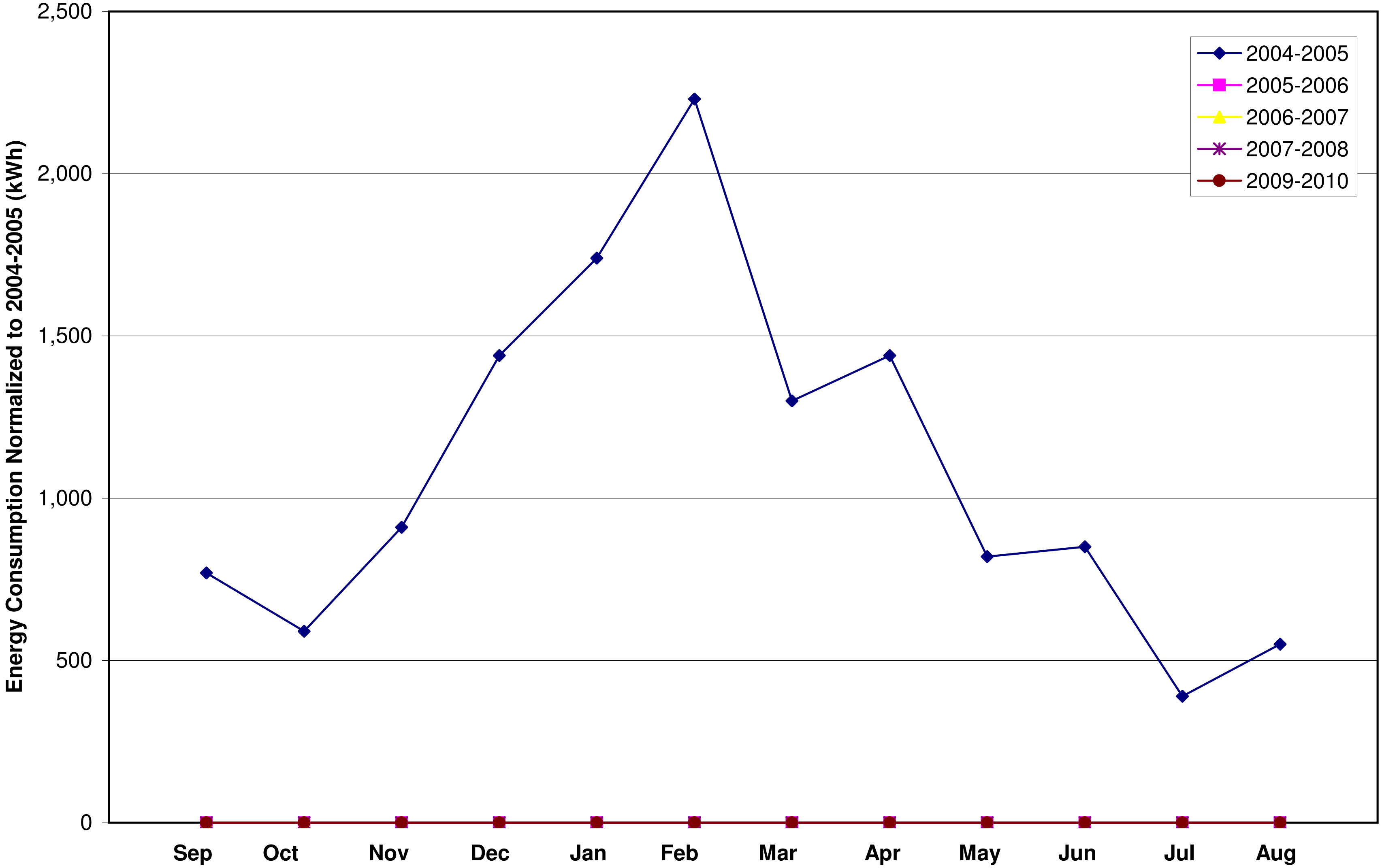


Table F.7 - Energy Consumption Monitoring Data for the Fire Hall

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September	570	44	1,025	155.4	1,025			0		#DIV/0!			0		#DIV/0!
October	1,100	278	3,977	417.6	3,977			0		#DIV/0!			0		#DIV/0!
November	2,100	564	7,937	577.8	7,937			0		#DIV/0!			0		#DIV/0!
December	2,630	927	12,224	977.5	12,224			0		#DIV/0!			0		#DIV/0!
January	3,560	1,653	20,668	1166	20,668			0		#DIV/0!			0		#DIV/0!
February	2,820	1,045	13,635	888.6	13,635			0		#DIV/0!			0		#DIV/0!
March	1,970	982	12,133	802.5	12,133			0		#DIV/0!			0		#DIV/0!
April	1,750	490	6,821	345.4	6,821			0		#DIV/0!			0		#DIV/0!
May	980	393	5,047	270	5,047			0		#DIV/0!			0		#DIV/0!
June	680	91	1,622	70.8	1,622			0		#DIV/0!			0		#DIV/0!
July	770	99	1,795	34.1	1,795			0		#DIV/0!			0		#DIV/0!
August	700	72	1,445	70.9	1,445			0		#DIV/0!			0		#DIV/0!
TOTAL	19,630	6,638	88,331	5777	88,331	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Brandon, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=CA&StationID=3471&Year=2005&Month=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F20) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.7 - Energy Consumption Monitoring Graph for Carberry's Fire Hall

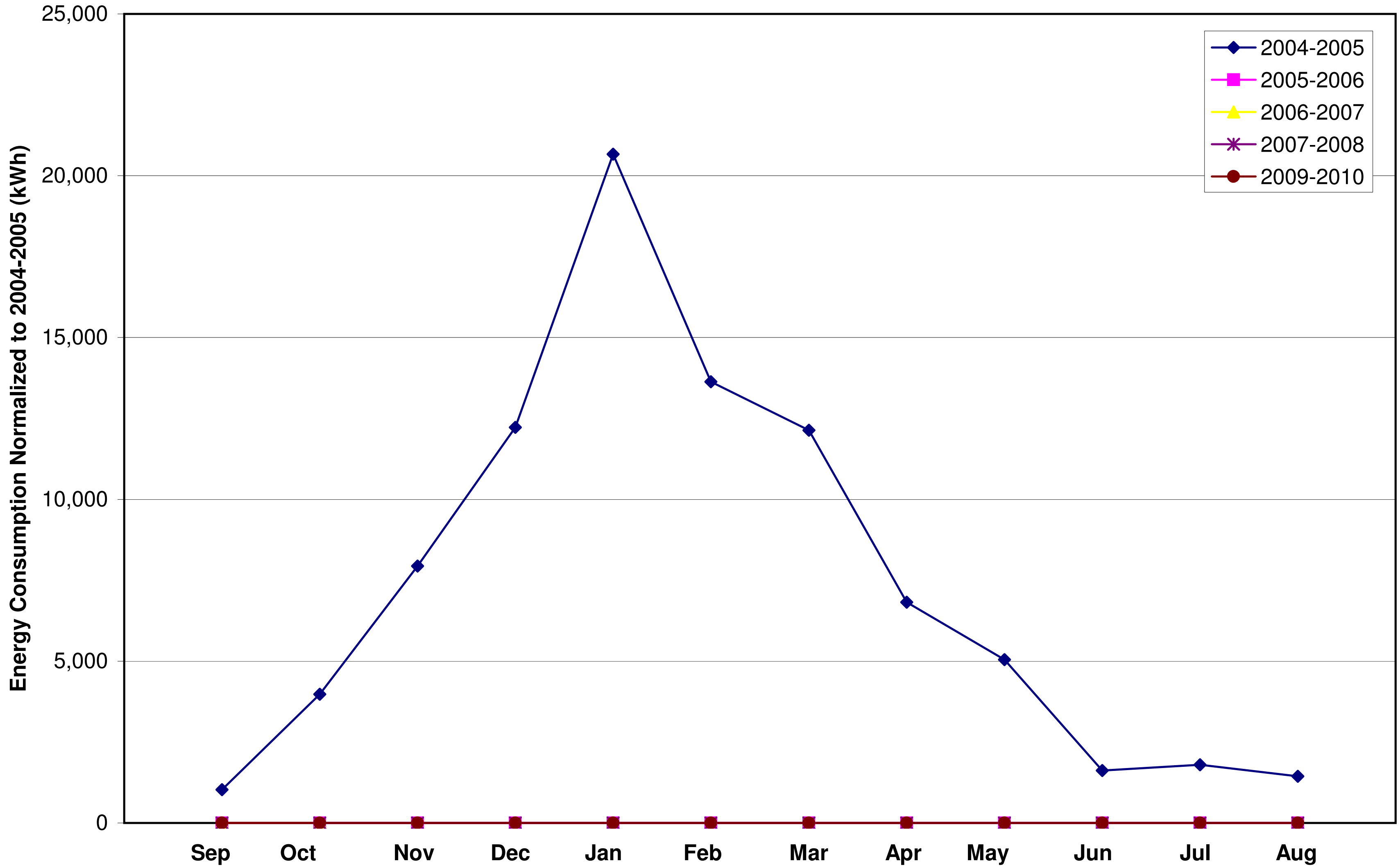


Table F.8 - Energy Consumption Monitoring Data for the Recycling Building

	2004-2005					2005-2006					2006-2007				
Month	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)
September	200	44	655	155.4	655			0		#DIV/0!			0		#DIV/0!
October	0	327	3,384	417.6	3,384			0		#DIV/0!			0		#DIV/0!
November	480	3	511	577.8	511			0		#DIV/0!			0		#DIV/0!
December	0	1,257	13,010	977.5	13,010			0		#DIV/0!			0		#DIV/0!
January	480	1,477	15,767	1166	15,767			0		#DIV/0!			0		#DIV/0!
February	0	1,735	17,957	888.6	17,957			0		#DIV/0!			0		#DIV/0!
March	270	1,163	12,307	802.5	12,307			0		#DIV/0!			0		#DIV/0!
April	0	1,051	10,878	345.4	10,878			0		#DIV/0!			0		#DIV/0!
May	140	88	1,051	270	1,051			0		#DIV/0!			0		#DIV/0!
June	20	0	20	70.8	20			0		#DIV/0!			0		#DIV/0!
July	60	146	1,571	34.1	1,571			0		#DIV/0!			0		#DIV/0!
August	40	94	1,013	70.9	1,013			0		#DIV/0!			0		#DIV/0!
TOTAL	1,690	7,385	78,123	5777	78,123	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

	2007-2008					2008-2009					2009-2010				
Month	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)	Billed Elect Energy (kWh)	Billed Natural Gas Energy (m^3)	Total Energy Consumption (kWh)	HDD (°C days/ mo)	Energy Normalized to 2004-2005 (kWh)
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Brandon, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=CA&StationID=3471&Year=2005&Month=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F20) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.8 - Energy Consumption Monitoring Graph for Carberry's Recycling Building

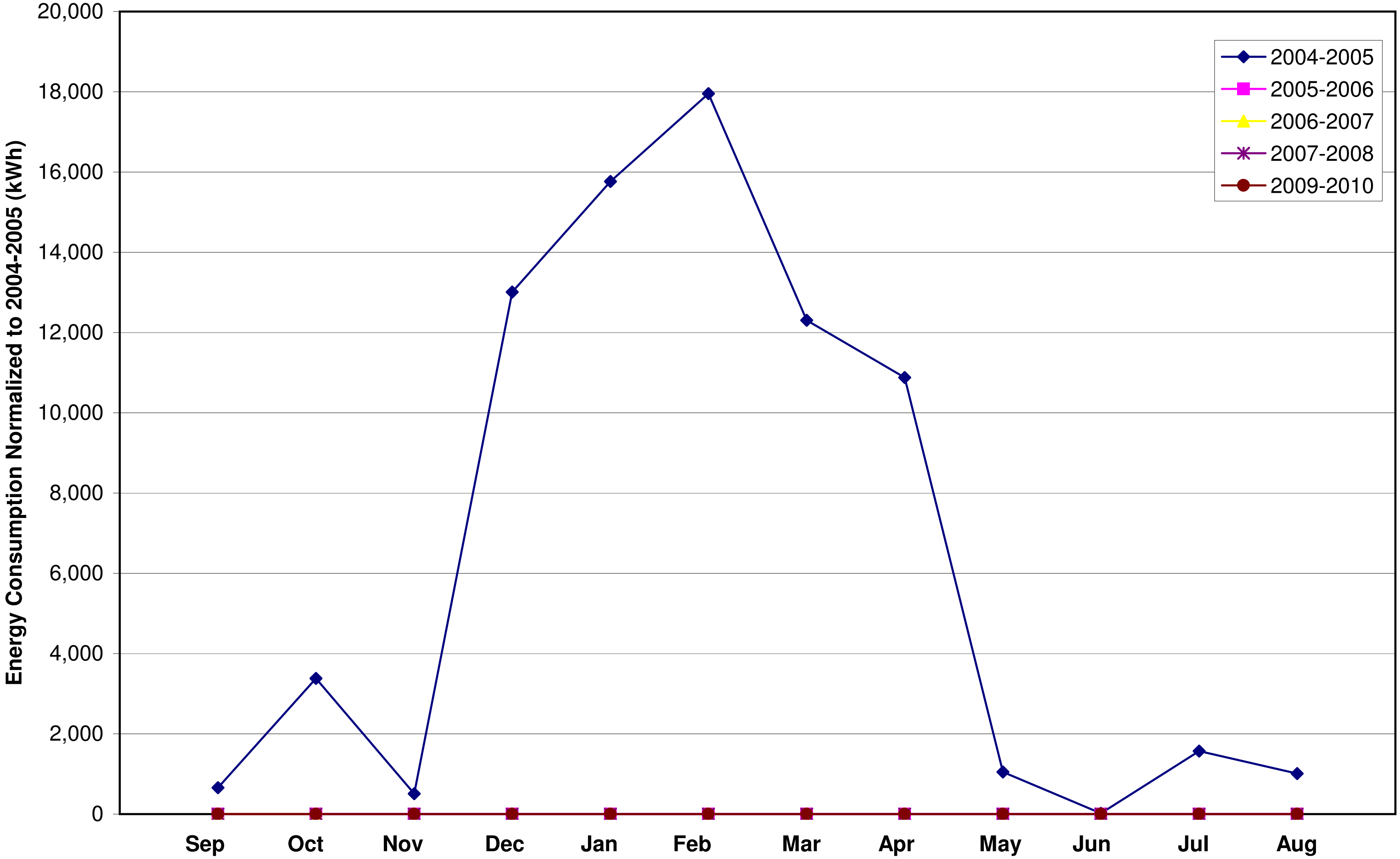


Table F.9 - Energy Consumption Monitoring Data for the Community Centre

	2004-2005					2005-2006					2006-2007				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September	17,610	8,016	100,573	155.4	100,573			0		#DIV/0!			0		#DIV/0!
October	28,000	215	30,225	417.6	30,225			0		#DIV/0!			0		#DIV/0!
November	66,400	4,183	109,693	577.8	109,693			0		#DIV/0!			0		#DIV/0!
December	61,200	6,064	123,961	977.5	123,961			0		#DIV/0!			0		#DIV/0!
January	60,800	9,697	161,161	1166	161,161			0		#DIV/0!			0		#DIV/0!
February	54,000	8,319	140,099	888.6	140,099			0		#DIV/0!			0		#DIV/0!
March	57,600	7,370	133,877	802.5	133,877			0		#DIV/0!			0		#DIV/0!
April	47,200	5,019	99,145	345.4	99,145			0		#DIV/0!			0		#DIV/0!
May	16,400	1,394	30,827	270	30,827			0		#DIV/0!			0		#DIV/0!
June	20,800	3,556	57,604	70.8	57,604			0		#DIV/0!			0		#DIV/0!
July	15,600	7,032	88,379	34.1	88,379			0		#DIV/0!			0		#DIV/0!
August	18,800	5,558	76,324	70.9	76,324			0		#DIV/0!			0		#DIV/0!
TOTAL	464,410	66,423	1,151,868	5777	1,151,868	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

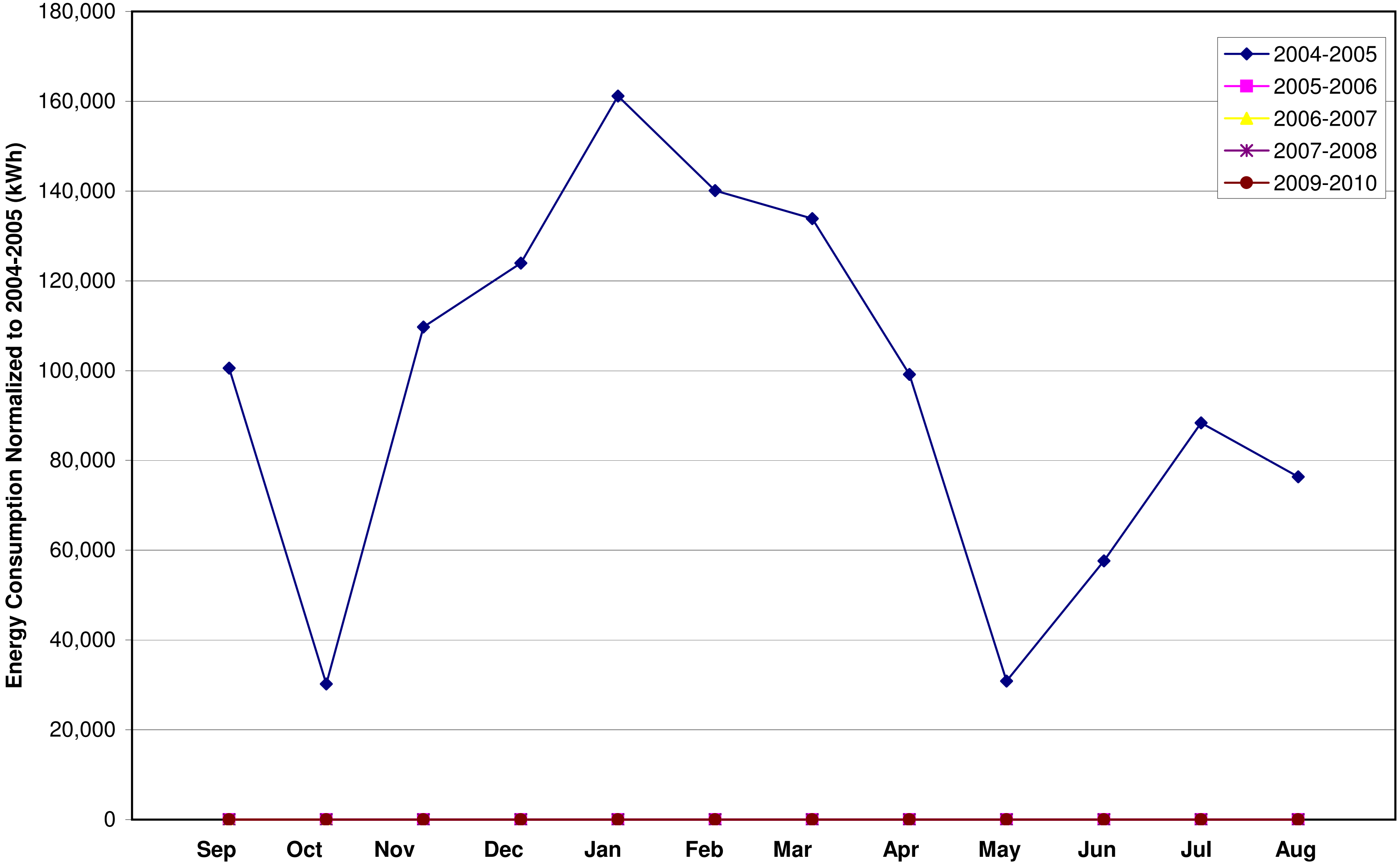
	2007-2008					2008-2009					2009-2010				
Month	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**	**Billed Elect Energy (kWh)**	**Billed Natural Gas Energy (m^3)**	**Total Energy Consumption (kWh)**	**HDD (°C days/ mo)**	**Energy Normalized to 2004-2005 (kWh)**
September			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
October			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
November			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
December			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
January			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
February			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
March			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
April			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
May			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
June			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
July			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
August			0		#DIV/0!			0		#DIV/0!			0		#DIV/0!
TOTAL	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!	0	0	0	0	#DIV/0!

Notes

* Energy consumption should be recorded following the implementation of the energy saving opportunities.

1. Enter the year in row 3 of this table (starting in column E,F,G).
2. Enter the "Billed Elec Energy" (in kWh) and the "Billed Natural Gas Energy" in (m^3) taken from the electricity and natural gas bills, respectively next to the appropriate month.
3. Go to the following website to collect information on the Heating Degree Days for Brandon, Manitoba: http://www.climate.weatheroffice.ec.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=CA&StationID=3471&Year=2005&Month=1
4. Once you've arrived at this website, select the appropriate month and click the mouse on "GO"
5. From this website, record the last number highlighted in blue (refer to page F20) in the column "Heat Deg Days". This number should be entered under the heading HDD of this table, next to the appropriate month.
6. The "Energy Normalized to 2004-2005" will be calculated automatically and this point will show up on the Energy Consumption graph.

Figure F.9 - Energy Consumption Monitoring Graph for the Carberry Plains Community Centre



Environment Canada Environnement Canada

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Daily Data Report for December 2005

Notes on Data Quality.

BRANDON A
MANITOBA

Latitude: 49° 55' N **Longitude**: 99° 57' W **Elevation**: 409.40 m

Climate ID: 5010480 **WMO ID**: 71140 **TC ID**: YBR

Daily Data Report for December 2005

Day	Max Temp °C	Min Temp °C	Mean Temp °C	Heat Deg Days C	Cool Deg Days C	Total Rain mm	Total Snow cm	Total Precip mm	Snow on Grnd cm	Dir of Max Gust 10's Deg	Spd of Max Gust km/h
01†	-10.8	-20.2	-15.5	33.5	0.0	0.0	T	T	9	33	33
02†	-10.8	-22.6	-16.7	34.7	0.0	0.0	T	T	9		<31
03†	-14.8	-19.2	-17.0	35.0	0.0	0.0	1.2	1.2	9		<31
04†	-16.7	-24.1	-20.4	38.4	0.0	0.0	T	T	9		<31
05†	-16.3	-21.6	-19.0	37.0	0.0	0.0	0.2	0.2	9		<31
06†	-12.2	-18.0	-15.1	33.1	0.0	0.0	0.8	0.6	10		<31
07†	-12.7	-20.7	-16.7	34.7	0.0	0.0	T	T	10		<31
08†	-8.5	-20.7	-14.6	32.6	0.0	0.0	0.0	0.0	10	23	39
09†	2.8	-8.9	-3.1	21.1	0.0	T	0.0	T	9	25	48
10†	2.6	-7.2	-2.3	20.3	0.0	0.0	T	T	8	32	43
11†	3.0	-7.1	-2.1	20.1	0.0	0.0	5.0	4.0	11	33	39
12†	1.0	-6.7	-2.9	20.9	0.0	0.0	0.0	0.0	10		<31
13†	-1.4	-6.1	-3.8	21.8	0.0	0.4	0.0	0.4	10	14	41
14†	-4.4	-11.7	-8.1	26.1	0.0	0.4	6.2	5.8	10	33	35
15†	-11.6	-14.0	-12.8	30.8	0.0	0.0	12.4	9.4	17	34	33
16†	-13.3	-16.0	-14.7	32.7	0.0	0.0	5.2	3.0	27	36	37
17†	-14.4	-26.2	-20.3	38.3	0.0	0.0	0.2	0.2	31		<31
18†	-17.1	-27.7	-22.4	40.4	0.0	0.0	T	T	31	26	44
19†	-7.7	-17.6	-12.7	30.7	0.0	0.0	T	T	31	27	46
20†	-7.4	-15.2	-11.3	29.3	0.0	0.0	0.4	0.2	31	26	43
21†	-1.2	-19.7	-10.5	28.5	0.0	0.0	0.0	0.0	31		<31
22†	-0.5	-5.3	-2.9	20.9	0.0	0.4	T	0.4	30		<31
23†	0.9	-2.3	-0.7	18.7	0.0	1.4	0.0	1.4	28	30	32
24†	0.5	-7.8	-3.7	21.7	0.0	0.0	T	T	25	29	32
25†	-2.0	-9.2	-5.6	23.6	0.0	0.0	0.0	0.0	24		<31
26†	2.4	-8.9	-3.3	21.3	0.0	0.0	0.0	0.0	24		<31
27†	-2.5	-6.3	-4.4	22.4	0.0	0.0	0.0	0.0	23		<31
28†	-2.2	-3.3	-2.8	20.8	0.0	0.0	T	T	23		<31
29†	-2.3	-4.0	-3.2	21.2	0.0	0.0	1.0	0.6	23		<31
30†	-2.2	-4.5	-3.4	21.4	0.0	0.0	0.2	T	23		<31
31†	-1.7	-3.9	-2.8	20.8	0.0	0.0	0.2	0.2	23		<31
Sum				852.8	0.0	2.6	33.0	27.6			
Avg	-5.9	-13.1	-9.5								
Xtrm	3.0	-27.7								25	48

Legend

[empty] = No data available

M = Missing

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APPENDIX G

THE MUNICIPALITIES TRADING COMPANY OF MANITOBA LTD. REPORT

TABLE OF CONTENTS - APPENDIX G

Member Services

The Municipalities Trading Company of Manitoba Ltd. (MTCML) allows AMM members to purchase products and services at lower prices through the power of bulk buying. This year was another great success. Sales remained consistent and the stable pool of official suppliers continued to change and grow. The products sales have consistently remained between 6.5 and 7.4 million dollars for the last 4 years.

The MTCML provides a major source of revenue for the AMM and allows the AMM membership dues to remain one of the lowest in Canada. This past year, the MTCML was able to rebate another $350,000 to our members based on their MTCML sales, bringing the cumulative rebate over the past four years to $1,250,000.

MTCML Official Suppliers

Official Suppliers are very important to the success of the MTCML. These suppliers offer hundreds of products and services that municipalities use. The Trading Company has individual contracts with each of these suppliers that ensure the best possible pricing for the purchasing members. In return, suppliers have direct contact with Manitoba's municipal market and can be a part of regular marketing opportunities through the AMM (mailings, Convention, trade shows, etc.) Each of our suppliers has shown long term commitment to the MTCML, creating a stable purchasing environment for the members of the AMM.

Corporate Members

At present fourteen companies make up the Corporate Members list of the AMM, five of these new for 2004/2005. These members assist the buying group in providing many services and hosting various events throughout the year.

*Last year, the MTCML was able to rebate **$350,000** to our members based on their MTCML sales, bringing the total rebate over the past four years to **$1,250,000**.*

Major Programs

There are also two major buying programs offered by the Trading Company. These programs are owned by the AMM membership, managed by the AMM and each administered by a company that has expertise in the program area.

Petroleum Products Buying Group (PPBG)

AMM has entered into contracts with both Imperial Oil and Petro Canada, on behalf of all of our participating Members, for the supply of gasoline, diesel and lubricants. Our objective is to combat one-sided pricing advantages enjoyed by petroleum suppliers and to assist our Members to purchase fuel at a lower cost while still supporting the local fuel dealers. Currently there are 77 AMM Members who purchase over 6,000,000 litres of fuel each year and about 130 other municipalities in Saskatchewan and Alberta who purchase an additional 29,000,000 litres of fuel annually.

The concept of AMM purchasing large volumes of fuel on behalf of our Members and the careful analysis of industry pricing means fuel savings for member municipalities in all three provinces. At the same time, local fuel dealers are supported. The program is administered by Prairie Fuel Advisors Inc., who also act as our purchasing agent.

The only cost for joining the PPBG is 1.2¢ per litre for the fuel purchased and 10¢ per litre for lubricants. A municipality may withdraw from the PPBG at any time, and there is no cost to withdraw.

MEMBER SERVICES

M.T.C.M.L.

Insurance

HED Hayhurst Elias Dudek Inc. INSURANCE AND RISK SERVICES

All AMM members outside of Winnipeg participate in the insurance program, administered by Hayhurst Elias Dudek on behalf of the AMM. Coverage includes property/road machinery and equipment; crime (loss of money); comprehensive general liability; errors and omissions liability; environmental impairment (pollution) liability; fire vehicle insurance; plus accident insurance for Councils, fire departments, ambulance services, and other 'volunteers'.

A major part of the program is the $3,500,000 annual self-insurance loss pool that keeps premiums much lower than if individual municipalities purchased their own coverage. Insurance is purchased from various providers for coverage in excess of the $3,500,000 annual loss pool amount, to provide complete protection. This allows the opportunity for significant refunds in low-claims years.

Last year, the AMM was able to offer an average 5% reduction in our insurance rates. As well, as a result of excellent risk management by municipalities, the AMM was able to refund $918,000 to municipalities out of the insurance loss pool.

Official Suppliers have shown long-term commitment to the MTCML.

MTCML Official Suppliers

Acklands Grainger Inc.
Airmaster Sales
Armtec
Bridgestone Canada Inc.
CD Awards
Darwen Road Technologies Ltd.
Denray Tire
Dust Free Road Maintenance
Fort Distributors Ltd.
Grand & Toy
Guardian Traffic Services Manitoba Ltd.
Hayhurst Elias Dudek Inc.
Kal Tire
MTS
Michelin
Norquay Printers Ltd.
PCO Orkin Swat Team
Prairie Fuel Advisors Inc.
Shippam & Associates Inc.
Souris Rock Shop
Tirecraft
Westcon Equipment & Rentals
Westman Steel Industries

AMM Corporate Members

Borland Construction
Cochrane Engineering
Guertin Equipment
Hayhurst Elias Dudek
Innovative Municipal Products Inc.
Manitoba Aboriginal and Northern Affairs
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Manitoba Hydro
Manitoba Mixed Concrete Association
Manitoba Pork Council
Mazer Group Construction Equipment
Robert Watson, Attorney
Strong-Coley & Associates
Westcon Equipment & Rentals Ltd.