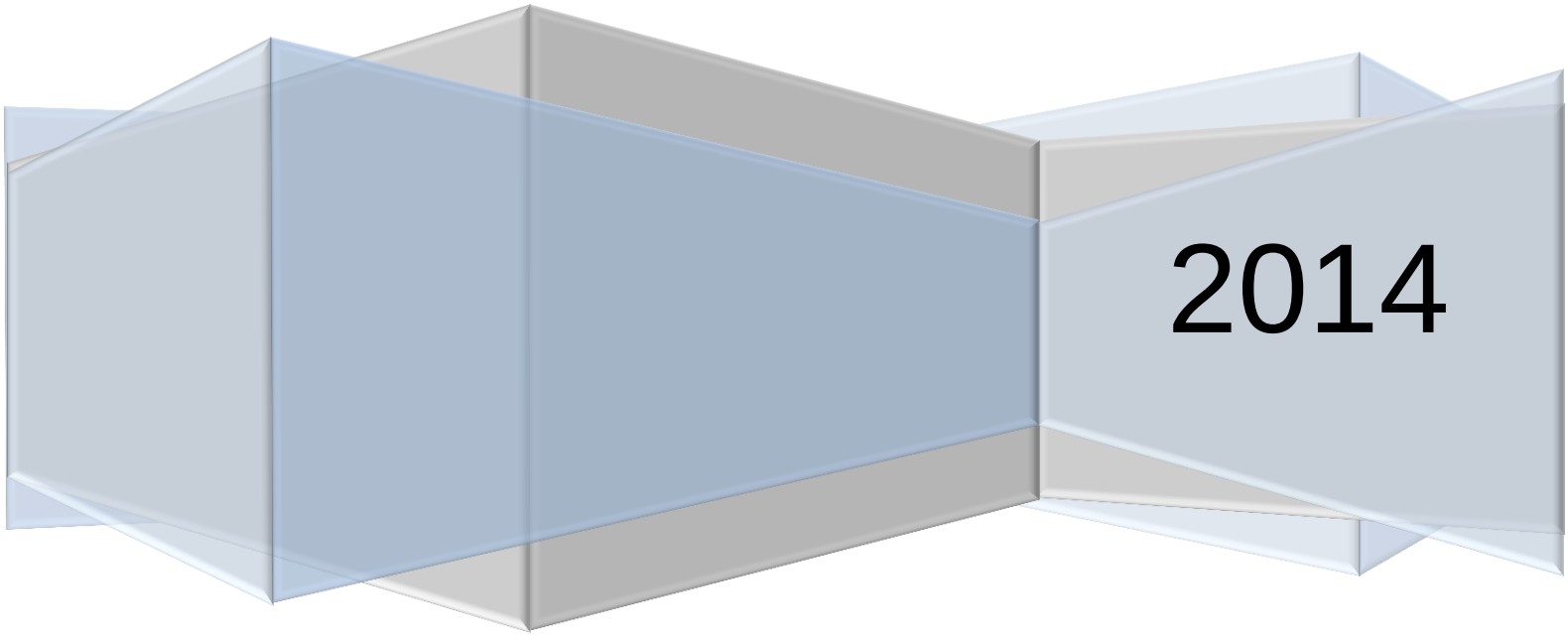
Energy Management & Demand Conservation Plan

The Town of Niagara-on-the-Lake

July 1, 2014



Executive Summary:

As of July 1, 2013, under Ontario Regulation 397/11 of the Green Energy Act, all broader public sector (BPS) organizations are required to report annual energy usage and greenhouse gas emissions. In addition, BPS organizations must develop a five-year energy conservation and demand management (CDM) plan by July 1, 2014.

Over the next 5 years, the Town of Niagara-on-the-Lake (the Town) will reduce the use of fuels and electricity by 5% to15%. The Town is committed to the allocation of resources to achieve these targets. The overall objectives of this plan are to:

1. Reduce dependence on fossil fuels through energy conservation and efficiency practices.
2. Reduce energy expenditures by investing in cost-effective plant and equipment upgrades.
3. Reduce pollution, particularly carbon dioxide emissions.
4. Purchase energy at the most economical price possible.

Current energy conservation measures include a policy to keep thermostats at set temperature levels and a capital program to replace existing streetlights with energy efficient LED lights. These programs will generate of approximately $46,000 in the first year of implementation, with benefits extending into future periods.

Future initiatives include capital retrofits of energy efficient machinery and equipment, and incorporating renewable energy sources such as solar panels into existing or new facilities. Programs that focus on behavioral changes include energy audits and employee engagement programs.

The elements of this plan are the first steps in the Town's progress towards an energy-conscious future. Targets and goals will be monitored on an ongoing basis, with results being posted annually. An update of this plan is required to be provided July 1, 2019. Under the guidance of the Town's Energy Management Committee, a continuing commitment will be kept to improve energy management and conservation demand strategies

Table of Contents

1.0 Introduction

As of July 1, 2013, under Ontario Regulation 397/11 of the Green Energy Act, all broader public sector (BPS) organizations are required to report annual energy usage and greenhouse gas emissions. In addition, BPS organizations must develop a five-year energy conservation and demand management (CDM) plan by July 1, 2014.

As a result, the Town's Energy Management Committee (which was formed in 2010) developed a corporate-wide energy policy for facilities and operations in 2012. This document addresses many of requirements for the CDM plan. In an effort to reduce duplication, sections of the Town's Corporate Energy Policy have been referenced in this plan and the policy is included as an appendix.

2.0 Commitment

- 2.1 Declaration of Commitment:

The Town will allocate the necessary resources to develop and implement a strategic energy management plan that will reduce energy consumption and its related environmental impact.

- 2.2 Vision:

The Town will exercise stewardship in its use of finite energy resources to optimize the delivery of services, and enhance the overall quality of life in the community.

- 2.3 Goals:

To continuously improve the energy efficiency of facilities and processes to reduce operating costs, energy consumption and greenhouse gas emissions.

- 2.4 Overall Target:

The Town will reduce its consumption of fuels and electricity in all municipal operations by 5% to15% over the next 5 years.

- 2.5 Objectives:

As per the Town's Corporate Energy Policy section 1.2, overall objectives of this plan are to:

1. Reduce dependence on fossil fuels through energy conservation and efficiency practices.

2. Reduce energy expenditures by investing in cost-effective plant and equipment upgrades.

3. Reduce pollution, particularly carbon dioxide emissions.

4. Purchase energy at the most economical price possible.

3.0 Organizational Understanding

- 3.1 Summary of Current Energy Consumption, Cost and GHGs:

During 2012, the total annual energy consumed from municipal operations was 7,049,111 ekWh per year, at a cost of $770,000 and associated GHG emissions have been estimated to be approximately 877,924 kilograms of carbon dioxide equivalent (eCO2).

- 3.2 Renewable Energy Utilized or Planned:

The Town aspires to show leadership in the promotion and development of renewable energy systems that are compatible with asset management and land use planning objectives. As a result, the Town will investigate the potential to develop solar photovoltaic systems on the rooftops of all corporate facilities with sound, south-facing roofs as the resources come available and as is deemed appropriate with respect to a facility's age.

4.0 Resources Planning

- 4.1 Energy Leader:

Leadership and overall responsibility for corporate energy management will be the responsibility of the Energy Management Committee. Through this committee, different programs and initiatives can be delegated to cross-functional teams for execution; this can include activities such as employee engagement and education programs, ensuring that new buildings contain energy efficient design elements, and energy audits of existing facilities.

5.0 Projects Execution

- 5.1 Municipal Level:

The Town will carry out the required business procedures and communication programs and implement them according to the planned time-lines with the resources available.

- 5.2 Asset Level:

The Town will use department and energy team representatives to facilitate the implementation of facility-level business procedures and communication initiatives, including energy performance reporting.

6.0 Review

- 6.1 Energy Plan Review:

The Town will review and evaluate its energy plan, revising and updating it as necessary, on an annual basis within corporate planning processes.

7.0 Evaluation Progress

Energy consumption for individual facilities will be benchmarked to similar facilities across the Province and within the Town. Over time, trends will become more apparent which will help determine if initiatives are performing as expected.

- 7.1 Energy Consumption:

Energy consumption in 2012 was reduced by approximately 0.7 million ekWh. Part of this can be attributed to the implementation of the initial phase of the Town's Corporate Energy Policy, which required indoor temperatures during occupied times to be set at 22°C (71°F) during the winter and 24°C (75° F) during the summer (section 2.1.3 of the Corporate Energy Plan).

8.0 Existing Measures

- 8.1 Corporate Energy Policy – Temperature Setbacks:

As noted in the attached Corporate Energy Policy, temperatures in facilities are to be kept at 22°C (71°F) during the winter and 24°C (75° F) during the summer. The cost of the program is minimal, requiring staff time to educate others and monitoring adherence.

Different agencies have reported energy savings ranging from 1% to 5%[1] by varying the thermostat by 1°; keeping it cooler in the winter and warmer in the summer. A conservative estimate of 3% savings per degree and a variance of 1° in summer and winter months from prior temperature settings could result in savings of approximately $6,000 per year (based on 2011 cost of electricity for monitored buildings: $196,000 x 3% = $5,880, rounded $6 K). This program is expected to continue indefinitely.

- 8.2 Town Street Lighting Replacement Program:

Beginning in summer of 2014, the Town will begin replacing existing street lights with energy efficient LED lights. The program is a turnkey operation provided by RealTerm Energy, whereby RealTerm will install and maintain the lights for a period of 10 years. During this time, the energy and maintenance savings will finance the capital replacement of the lights. After this time period, the maintenance of the lights will revert to the Town, including the full benefit of the energy and maintenance savings.

The savings estimated by RealTerm were as high as 69% in energy savings (cost savings of 34%) and 80% less maintenance costs. This translates into annual kWh savings of 412,233 per year, or a reduction in cost of $40,039 in its first year of operation. This program will run for up to 20 years, which is the expected life of the lights.

[1] 1% per degree: Energy.gov http://energy.gov/energysaver/articles/thermostats
5.4% per degree: Energy Hub http://www.energyhub.com/news/how-much-is-one-degree-worth/
4% per degree: US Environmental Protection Agency: http://www.epa.gov/region7/citizens/pdf/EPA_HomeHelps.pdf

9.0 Long-Term Goals:

Through its Corporate Energy Policy, the Town will embark on a number of initiatives which will result in cost and energy savings. Some elements of this policy include:

- Monitoring and Targeting Program – Ongoing monitoring of all utilities, comparing results to benchmarks and standards.
- Verification and Validation of Utility Bills – Ensuring correct application of energy rates and charges.
- Real-Time Monitoring of all Utilities – Real-time feedback for confirmation of operational changes.
- Standards of Performance – Defining standards for operations and correcting areas which are outside these areas.
- Retrofits and Capital Renewal – Updating mechanical equipment in older facilities and ensuring new buildings are built with energy-efficient elements.
- Corporate Programs – Temperature setback, an after-hours "lights out" program," and water conservation practices.
- Energy Efficient Lighting & Accessible Design Standards.
- Roof Capital Replacement Program – Use of a "Green" roof for Town Facilities.
- Energy Efficient Equipment Purchasing – Purchase products that are identified as energy efficient.

Costs and savings will be evaluated on a per project basis. To date, the Town has successfully implemented items listed under section 8 and will move forward with other initiatives under the guidance of its Energy Management Committee as resources permit.

10.0 Renewable Energy Sources

The Town does not currently use any renewable energy generation for facilities.

A new Operations Centre will be created which merges Public Works with Parks and Recreation. All staff within these areas will now work under one roof. Energy efficient elements have been incorporated into the design of the renovated building, such as large windows to harness the sun's energy in the winter and building the roof to accommodate future solar panels.

11.0 Conclusion

Under the guidance of its Energy Management Committee, the Town of Niagara-on-the-Lake will continue its commitment to improved energy management and conservation demand strategies.

Energy Consumption and GHG Emissions

From: 2012-01-01 To: 2012-12-31

Facility Name	Address	Total Area (m2)	Average Hours/Day	Fuel Types	Consumption	Energy (ekWh/yr)	GHG Emissions (kg CO2e/yr)	GHG Intensity (kg CO2e/m2)	Energy Intensity
Facility Primary Type: Office									
Municipal Office	1593 Four Mile Creek Rd								
		464	9.04	NG	9,093.00 m3	96,638.38	17,191.47	37.05	208.27 (ekWh/m2)
				Elect.	218,080.00 kWh	218,080.00	20,944.40	45.14	470.00 (ekWh/m2)
PW Office	1593 Four Mile Creek Rd								
		1,470	9.04	NG	11,288.00 m3	119,966.35	21,341.40	14.52	81.61 (ekWh/m2)
				Elect.	111,574.00 kWh	111,574.00	10,715.57	7.29	75.90 (ekWh/m2)
Facility Type Total						**546,258.72**	**70,192.84**		
Facility Primary Type: Library									
Library	10 Anderson Lane								
		946	7.95	NG	15,278.00 m3	162,371.18	28,885.00	30.53	171.64 (ekWh/m2)
				Elect.	109,065.00 kWh	109,065.00	10,474.60	11.07	115.29 (ekWh/m2)
Library	32 Queenston St								
		167	8.77	NG	5,283.00 m3	56,146.55	9,988.18	59.81	336.21 (ekWh/m2)
				Elect.	4,472.00 kWh	4,472.00	429.49	2.57	26.78 (ekWh/m2)
Facility Type Total						**332,054.72**	**49,777.28**		
Facility Primary Type: Fire									
Fire Station 1	2 Anderson Lane								
		929	24	NG	22,349.00 m3	237,520.19	42,253.62	45.48	255.67 (ekWh/m2)
				Elect.	66,318.00 kWh	66,318.00	6,369.18	6.86	71.39 (ekWh/m2)
Fire Station 2	745 Warner Rd								
		585	24	NG	11,266.00 m3	119,732.54	21,299.80	36.41	204.67 (ekWh/m2)
				Elect.	32,711.00 kWh	32,711.00	3,141.56	5.37	55.92 (ekWh/m2)
Fire Station 4	5 Dumfries St								
		465	24	NG	7,556.00 m3	80,303.48	14,285.58	30.72	172.70 (ekWh/m2)
				Elect.	27,234.00 kWh	27,234.00	2,615.55	5.62	58.57 (ekWh/m2)

Facility Name	Address	Total Area (m2)	Average Hours/Day	Fuel Types	Consumption	Energy (ekWh/yr)	GHG Emissions (kg CO2e/yr)	GHG Intensity (kg CO2e/m2)	Energy Intensity
Fire Station 5	350 Townline Rd								
		836	24	NG	13,353.00 m3	141,912.71	25,245.54	30.2	169.75 (ekWh/m2)
				Elect.	56,515.00 kWh	56,515.00	5,427.70	6.49	67.60 (ekWh/m2)
Fire Station 3	1391 Conc Rd 6								
		976	24	NG	13,556.00 m3	144,070.15	25,629.34	26.26	147.61 (ekWh/m2)
				Elect.	70,812.00 kWh	70,812.00	6,800.78	6.97	72.55 (ekWh/m2)
Facility Type Total						**977,129.06**	**153,068.67**		
Facility Primary Type: Community Centre									
Community Centre	29 Platoff St								
		2,787	8.22	NG	5,822.00 m3	61,874.92	11,007.23	3.95	22.20 (ekWh/m2)
				Elect.	6,866.00 kWh	6,866.00	659.41	0.24	2.46 (ekWh/m2)
Community Centre: Board Rooms	14 Anderson Lane								
		1,811	12.82	NG	34,936.08 m3	371,292.83	66,051.09	36.47	205.02 (ekWh/m2)
				Elect.	286,083.69 kWh	286,083.69	27,475.48	15.17	157.97 (ekWh/m2)
Community Centre: Auditorium	14 Anderson Lane								
		418	12.82	NG	8,063.66 m3	85,698.73	15,245.36	36.47	205.02 (ekWh/m2)
				Elect.	66,031.46 kWh	66,031.46	6,341.66	15.17	157.97 (ekWh/m2)
Community Centre: Café	14 Anderson Lane								
		186	12.82	NG	3,588.13 m3	38,133.89	6,783.82	36.47	205.02 (ekWh/m2)
				Elect.	29,382.42 kWh	29,382.42	2,821.89	15.17	157.97 (ekWh/m2)
Community Centre: Track	14 Anderson Lane								
		186	12.82	NG	3,588.13 m3	38,133.89	6,783.82	36.47	205.02 (ekWh/m2)
				Elect.	29,382.42 kWh	29,382.42	2,821.89	15.17	157.97 (ekWh/m2)
Facility Type Total						**1,012,880.26**	**145,991.66**		
Facility Primary Type: Recreation Complex									
VBA Building	1567 Four Mile Creek Rd								
		268	5.75	Elect.	21,283.00 kWh	21,283.00	2,044.02	7.63	79.41 (ekWh/m2)
Facility Type Total						**21,283.00**	**2,044.02**		
Facility Primary Type: Other									
Old Firehall - Air Cadets	1607 Four Mile Creek Rd								

Facility Name	Address	Total Area (m2)	Average Hours/Day	Fuel Types	Consumption	Energy (ekWh/yr)	GHG Emissions (kg CO2e/yr)	GHG Intensity (kg CO2e/m2)	Energy Intensity
		290	0.07	NG	3,819.00 m3	40,587.48	7,220.30	24.9	139.96 (ekWh/m2)
				Elect.	3,544.00 kWh	3,544.00	340.37	1.17	12.22 (ekWh/m2)
Conc 5 Bulk Water	615 Concesssion 5								
		9	9.97	Elect.	3,432.00 kWh	3,432.00	329.61	36.62	1,410.72 (ekWh/ML)
Court House	26 Queen St								
		1,300	15.89	NG	18,114.00 m3	192,511.55	34,246.82	26.34	148.09 (ekWh/m2)
				Elect.	256,960.00 kWh	256,960.00	24,678.44	18.98	197.66 (ekWh/m2)
Irrigation Pump House (D-Road)	88 Queenston St								
		50	6.85	Elect.	434,881.00 kWh	434,881.00	41,765.97	835.32	180.77 (ekWh/ML)
Irrigation Pump House	Concession 3/ Line 1								
		4	0.55	Elect.	11,346.00 kWh	11,346.00	1,089.67	272.42	540.29 (ekWh/ML)
Virgil Bulk Water	11 Walker Rd								
		9	9.97	Elect.	5,034.00 kWh	5,034.00	483.47	53.72	120.14 (ekWh/ML)
Wading Pool	25 Picton St								
		1,500	14	Elect.	4,143.00 kWh	4,143.00	397.89	0.27	2.76 (ekWh/m2)
Cemetary BRD: Shop	1483 Lakeshore Rd								
		114	6.05	NG	2,230.19 m3	23,701.95	4,216.46	36.99	207.91 (ekWh/m2)
				Elect.	5,459.68 kWh	5,459.68	524.35	4.6	47.89 (ekWh/m2)
Cemetary BRD: Office	1483 Lakeshore Rd								
		108	6.05	NG	2,112.81 m3	22,454.48	3,994.54	36.99	207.91 (ekWh/m2)
				Elect.	5,172.32 kWh	5,172.32	496.75	4.6	47.89 (ekWh/m2)
St. Davids Pool: Pool (m3)	1446 York Rd								
		490,000	2.4	NG	6,266.80 m3	66,602.19	11,848.19	0.02	0.14 (ekWh/m2)
				Elect.	20,931.35 kWh	20,931.35	2,010.25	0	0.04 (ekWh/m2)
St. Davids Pool: Changerooms	1446 York Rd								
		138	2.4	NG	.20 m3	2.08	0.37	0	0.02 (ekWh/m2)
				Elect.	.65 kWh	0.65	0.06	0	0.00 (ekWh/m2)
Main St Public Washrooms	92 Queen St								
		95	14	Elect.	10,092.00 kWh	10,092.00	969.24	10.2	106.23 (ekWh/m2)
Public Washrooms	14 Market St								
		158	14	NG	2,978.00 m3	31,649.52	5,630.29	35.63	200.31 (ekWh/m2)
				Elect.	33,359.00 kWh	33,359.00	3,203.80	20.28	211.13 (ekWh/m2)

Facility Name	Address	Total Area (m2)	Average Hours/Day	Fuel Types	Consumption	Energy (ekWh/yr)	GHG Emissions (kg CO2e/yr)	GHG Intensity (kg CO2e/m2)	Energy Intensity
NOTL Pool: Pool (m3)		370 King St							
		662,445	2.4	NG	30,425.48 m3	323,355.26	57,523.24	0.09	0.49 (ekWh/m2)
				Elect.	49,641.53 kWh	49,641.53	4,767.57	0.01	0.07 (ekWh/m2)
NOTL Pool: Changerooms		370 King St							
		297	2.4	NG	1.52 m3	16.11	2.87	0.01	0.05 (ekWh/m2)
				Elect.	2.47 kWh	2.47	0.24	0	0.01 (ekWh/m2)
Public Washrooms	Queens Royal Park								
		58	5.75	Elect.	3,283.00 kWh	3,283.00	315.30	5.44	56.60 (ekWh/m2)
Visitor Information Centre	41 Queen's Parade								
		107	5.75	Elect.	37,185.00 kWh	37,185.00	3,571.25	33.38	347.52 (ekWh/m2)
Facility Type Total						**1,585,347.64**	**209,627.28**		
Facility Primary Type: Water Treatment Facility									
Whirlpool	3064 Whirlpool Rd								
		50	5.48	Elect.	85,800.00 kWh	85,800.00	8,240.23	164.8	127.42 (ekWh/ML)
Facility Type Total						**85,800.00**	**8,240.23**		
Facility Primary Type: Single-Pad Arena									
Centennial Arena	1565 Four Mile Creek Rd								
		2,995	18.63	NG	81,197.00 m3	862,943.61	153,513.24	51.26	288.13 (ekWh/m2)
				Elect.	507,600.00 kWh	507,600.00	48,749.90	16.28	169.48 (ekWh/m2)
Meridian Credit Union Arena	1567 Four Mile Creek Rd								
		3,174	18.63	Elect.	845,919.00 kWh	845,919.00	81,242.06	25.6	266.52 (ekWh/m2)
Facility Type Total						**2,216,462.61**	**283,505.21**		
Facility Primary Type: Streetlights (optional)									
Town Streetlighting (# of lights)									
		1,598	3.29	Elect.	851,713.00 kWh	851,713.00	81,798.52	51.19	532.99 (ekWh/m2)
Rural Streetlighting (# of lights)									
		395	8	Elect.	210,329.00 kWh	210,329.00	20,200.00	51.14	532.48 (ekWh/m2)
Facility Type Total						**1,062,042.00**	**101,998.51**		
Grand Total						**7,839,258.01**	**1,024,445.69**		

Corporate Energy Policy for Corporation Facilities and Operations

The Town of Niagara-On-The-Lake

Prepared By:
Energy Management Committee
January 2012

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Town of Niagara-on-the-Lake's Energy Policy is designed to:

- Facilitate the achievement of Corporate-wide energy reduction targets
- Address reporting requirements as per provincial legislation.
- Provide for ongoing Energy Monitoring and Targeting of utility usage.
- Define policies on capital investment related to energy
- Define policies related to energy procurement.

The Energy Policy incorporates the following key components:

1) Strategy for Achieving Energy Reduction Targets

a) Monitoring and Targeting of Existing/New/Retrofitted Buildings
b) Conservation and Demand Management Investment: Existing Buildings
c) Conservation and Demand Management Investment: Major Renovations / New Construction
d) Implementation of Eco-Responsive Energy Management Policies

2) Specific Policies: Capital Investment Related to Energy

a) Energy Management Standard - Central Building Automation System control
b) Incandescent Lighting & Accessible Design Standards
c) Roof Capital Replacement Evaluation
d) Energy Efficient Equipment Purchasing
e) Electricity Generation, Cogeneration, District Energy
f) Back-up / Emergency Power Systems

3) Specific Policies: Energy Procurement

a) Energy Procurement
b) Green power
c) Renewable Energy

This document represents proposed guidelines and is subject to future change.
The Town of Niagara-on-the-Lake Energy Management Committee wishes to acknowledge the contribution and guidance of the Office of Energy Initiatives, City of Hamilton.

1.0 INTRODUCTION

1.1 Background

As with most Canadian municipalities, the Town of Niagara-on-the-Lake is under significant budgetary pressures and searching for ways to increase efficiencies in its operations. A key area identified in this regard is energy usage and consumption. For the fiscal year ending 2009, total energy costs for all department operations exceeded $800,000.

In June 2009, Town Council passed a motion to create an Energy Management Committee which was charged with developing a sustainable and environmentally-friendly energy plan for all Town operations and assets. This approach was further reinforced during a Strategic Plan exercise in 2010, which called for the use of best practices and benchmarking as ways to ensure continuous improvement.

For the fiscal year ending 2009, total energy costs for all department operations exceeded $800,000

Much of the Committee's mandate is to focus on the corporate-wide management of waste, emissions and expenses associated with each asset and to achieve, not only a reduction of energy costs, but to seek economic benefits and opportunities for the Town. An additional goal of the Committee is to assist residents and local businesses in managing their own energy resources and to encourage sustainability in public behaviour.

This strategy is designed to minimize the economic burden on the municipality through the adoption of effective environmental and financial management strategies.

1.2 Objectives

- To reduce dependence on fossil fuels through energy conservation and efficiency practices.
- To reduce energy expenditures by investing in cost-effective plant and equipment upgrades that have a simple payback return on investment of seven years or less.
- To reduce pollution, particularly carbon dioxide emissions, by exploring options to source energy from less greenhouse-intensive sources and more sustainable measures.
- To purchase energy at the most economical price possible.

1.3 Action Plan

Through this policy, the Energy Management Committee will undertake a number of initiatives over this term of Council to provide an integrated organization-wide response to energy management. The Committee will be responsible for the identification and implementation of energy efficient practices and projects through an Action Plan which includes:

- A comprehensive audit of all energy consuming capital assets and operations.
- Establishment of an energy database that allows for the collection, monitoring and reporting of all data on energy consumption, costs, savings and performance indicators.

- Establishment of baseline emissions targets for the next four year period.
- Development of an energy efficient purchasing policy for all capital assets and energy sources.
- Development of a communications strategy to raise both staff and public awareness.

1.4 Bill 21 – Energy Conservation Responsibility Act

The Town of Niagara-on-the-Lake has a responsibility to adhere to all provisions outlined in the provincial legislation Bill 21 – Energy Conservation Responsibility Act and its attendant regulations. Some of the highlights include:

- **The Act empowers the government to pass regulations requiring the Broader Public Sector (Ministries, Agencies and MUSH Sectors) to develop energy conservation plans.**
- **Enacts amendments to the Electricity Act, 1998 and the Ontario Energy Board Act, 1998 to support the government's smart metering initiative.**
- **Repeals a section of the Conservation Authorities Act to permit Conservation Authorities to market or sell water power created on lands vested in them.**

1.5 Energy Reduction Savings

Whenever possible, the Town of Niagara-on-the-Lake will strive for maximum energy efficiency through the development of energy reduction targets.

1.6 Corporate Energy Management Committee

Structure and Resources

In addition to the Chair and Recording Secretary, the Committee includes two members of Town Council and at least three appointed members of the public, as well as a member from Niagara-on-the-Lake Hydro. A member of Town Public Works staff acts as liaison to the Committee. Staff from other departments may be requested to attend from time to time.

Members of the Committee are required to meet the requirements of the Municipal Conflict of Interest legislation, and should have expertise and experience relevant to energy conservation, building and property management and/or engineering, architecture or environmental studies.

The Committee may, from time to time, invite people with particular expertise or interest to attend committee meetings, make presentations and/or otherwise assist the Committee in its deliberations.

The Committee will receive financial resources from Town through its regular budget process.

Accountability

As a Committee of Council, the Energy Management Committee shall provide regular activity reports to Council, together with periodic updates as required.

2.0 STRATEGY FOR ACHIEVING ENERGY EFFICIENCY

To ensure that the Town moves energy Conservation and Demand Management (CDM) activities to the forefront of normal business practices, the Town will need to achieve its energy reduction results through a combination of:

1) Monitoring and Targeting of Existing/New/Retrofitted Buildings
2) Investment in Energy Efficiency - Existing Buildings
3) Implementation of Energy Efficient Design - Major Renovations / New Construction
4) Implementation of Eco-Responsive Energy Management Policies

These are outlined in the following sections.

2.1 Monitoring and Targeting Program

Energy accounting is a cornerstone of an effective energy management program. Monthly utility usage and costs should be monitored to identify trends, highlight anomalies, and benchmark facility usage against that of similar buildings in the portfolio.

Monitoring and Targeting is the next level in utility cost management, as it allows for more timely identification of energy usage anomalies. This is to be implemented at all existing / new buildings.

The vision is for energy to be managed through a management-by-exception process at the building level. Here daily target utility load profiles would be generated for each building based on day type and hourly weather data for comparison against real-time metering data. Using these tools, it will be possible to identify variances or exceptions that can be investigated to resolve any problems.

To get to this point, the following key components of this strategy must be in place:

1) Ongoing Time Monitoring of All Utilities
2) Standards of Performance

These are explored in the following sections.

2.1.1 Verification and Validation of Utility Bills

The Town will monitor utility bills (verify and validate) for the correct application of energy rates, demand and energy consumption charges.

2.1.2 Ongoing Real-Time Monitoring of All Utilities

Each utility (e.g. electricity, gas, water) should be tracked for each building on an hourly basis (where available). The addition of real-time metering enables real-time feedback confirmation to operational changes, and allows targeted measures to be monitored and their positive financial effects confirmed.

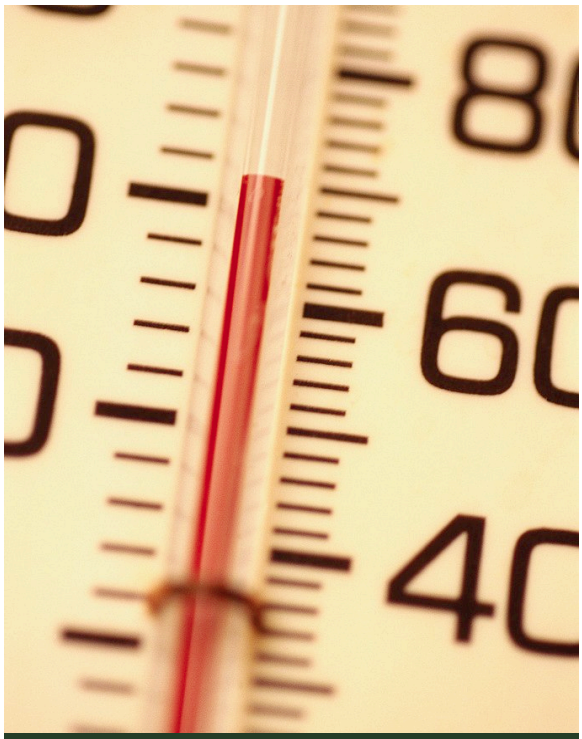
The Town of Niagara-on-the-Lake's buildings should move towards having interval meters on their electrical services and pulse outputs on their gas and water meters as a basic first step.

2.1.3 Standards of Performance

Efficient building operation must be defined in order to be managed. Once standards for efficient operation are quantified, operation and maintenance effectiveness can be measured. Early identification of operational problems also mitigates the risk of having significant operation failures.

The following temperature settings apply to all Town Facilities unless a deviation from the standard is required as determined by Corporate Services due to mechanical or system limitations:

- Indoor temperature settings in all spaces during occupied periods will be set to 22°C (71°F) during the winter and 24°C (75°F) during the summer. Whenever possible, occupants are encouraged to abide by these settings, depending on the occupancy and facility involved.
- Indoor temperature settings in all spaces during unoccupied periods will be 18°C (64° F) during the winter and 27°C (81° F) during the summer. The exception is for pre- heating or pre-cooling periods necessary to maintain building system performance during occupied periods, especially during adverse weather conditions.



Indoor temperature settings in all spaces during occupied periods will be set to a staged setback of 22°C (71°F) during the winter & 24°C (75°F) during the summer.

Some spaces, such as the Arena facilities and Courthouse, requiring critical temperature settings will be more tightly controlled and will be addressed as exceptions to the Energy Policy where necessary.

Occupants who control their own thermostats are required to adhere to these temperature standards also.

A performance standard must be measurable and quantifiable. The following are examples of potential standards of performance for the Town of Niagara-on-the-Lake's buildings:

- Desirable domestic hot water tank temperature should be based on commonly accepted principles and depending on the equipment involved. For example, most Canadian government agencies and the World Health Organization recommend 60°C (140°F) with the addition of a mixing valve to cool the water to 49°C (120°F) to prevent scalding. The Ontario Building Code requires the mixing valve on all new residential water heater installations. We recommend that a tankless water heater be set between 50-55°C in public washrooms since the water is only heated when required.
- Minimum light levels in offices, hallways, storage areas, etc (e.g. 400 LUX) should be set according to FADS (Facility Accessibility Design Standards) requirements.
- Maximum CO_2 level in offices, resident spaces, etc (e.g. 700 ppm above ambient)
- Fan operation: when outdoor air temperature >12°C.

When it comes time to consider / evaluate energy efficiency measures (e.g. lighting retrofits, control of fresh air volume using CO_2, etc.), these provide useful guidelines/checks.

Definitions of the standards are not arbitrary. The standards must reflect building code requirements, good operations and maintenance practices, and occupant needs.

2.2 CDM Investment: Existing Buildings

CDM Activities can benefit the Town through:

1. Reduced Energy Demand & Consumption
2. Reduced Energy Costs
3. Reduced Environmental Emissions
4. Reduced Maintenance Costs
5. Reduced Exposure to Energy Market Volatility (Risk Mitigation)
6. Improved Working Environments
7. Improved Productivity
8. Leveraging external funds by meeting high performance standards

2.2.1 Strategy: CDM Retrofits and Capital Renewal/Life Cycle Replacements

CDM Retrofits tend to be initiatives or project specific, where a new energy efficient technology or group of technologies are added or retrofit within a facility or group of facilities (e.g. Energy Retrofit Pilot Program).

Capital Renewal/ Life Cycle Replacements are generally managed by the Department which carries responsibility for operating and maintaining the existing or original equipment (e.g. Main Administration Building, Public Works, Parks & Recreation). Typical projects include major capital replacements of chillers, boilers, roofs, windows, fans, pumps, piping etc.

Typically equipment to be considered for this process includes:

- HVAC equipment (e.g. boilers, chillers, pumps, motors etc.)
- Lighting and controls
- Building envelope (e.g. roofs, insulation, windows and doors etc.)
- Water use (e.g. pools, toilets, water reclaim etc.)
- BAS (building automation system) controls
- Process improvements
- Back-up generators
- Any other energy consuming device

These types of projects generally follow 4 steps:

1. Project Identification & Feasibility - Energy Audits, Feasibility Analysis or through detailed Condition Assessments.
2. Planning & Budgeting - Project Financing, Incentives, Business Case & Approvals
3. Implementation –Tender, Project Execution, Project Management, Commissioning
4. Monitoring & Verification – Measure and Verify Results, Reporting Achievements

The intent is to make CDM part of the Town's normal course of business for all facility and operational retrofits, including capital renewal and life cycle replacement projects. Success means incorporating CDM options at the initial stages of a project design. This ensures that options for improving energy efficiency are considered, evaluated and quantified in terms of life cycle costing analysis, including cost, maintenance, performance and emission reductions.

Projects will continue to be managed by the Department which carries responsibility for operating and maintaining existing or original equipment. Specific departments will be responsible for implementation and the follow-up to the recommended (5) step process (below). In the following recommendations, all facility and operational CDM retrofits and capital renewal/ life cycle replacement projects, would be required to adapt to the following procedures:

1) Identify government and utility funding programs (incentives):

Incentives funding opportunities for CDM projects and feasibility studies are on the rise. Funding opportunities exist today that were not available in previous years. It is anticipated that, unless there is a major shift politically at the Provincial and Federal levels of government, incentive funding for CDM activities is expected to be available to encourage greater efficiency levels for at least the next 3 to 5 years.

In many cases, these funds can be used to cover a portion of both the feasibility/engineering study costs and part of the incremental costs of the energy efficient upgrade.

2) Determine the project base case(s) vs. the alternative CDM option(s).

For CDM retrofit projects the "base case" is usually the existing equipment. For Capital Renewal/ Life Cycle Replacement Projects, the "base case" is typically the standard efficiency replacement option.

Note: Check incentive/ funding criteria before proceeding. In some cases the funding can be for prescriptive measures. Nevertheless, the existing, base case and energy efficiency options must all be considered for tracking and reporting purposes.

3) Identify the following for each option on an annual and life cycle cost basis:

- Associated project / equipment costs
- Energy consumption and energy demand (e.g. kWh, kW, GJ, M3, L etc.,)
- Energy/ utility costs and savings
- Maintenance and operational savings
- Impact with and without financial incentives or funding.

Energy rate escalators should be factored in savings. Determining the equipment cost, energy consumption, and cost savings associated with all options is necessary for qualifying for incentive funding and for internal tracking purposes.

4) Identify project recommendations for proceeding with the base case or the more — energy efficient option and reasons/ rationale why.

These steps are important to ensure that energy efficiency is considered in all projects and for incentives application which will in most cases compare an energy efficient option to a base case. It also provides the Town with the ability to track all energy saving initiatives and their environmental and cost savings.

2.3 CDM Investment: Major Renovations / New Construction

Major renovations are similar to new construction in that they involve major capital and planning resources. New construction projects involve the complete design, development and construction of a new facility.

It is important to ensure that CDM options are properly evaluated in the early stages of any project development (i.e. renovation or new construction). The Town may wish to consider the general policy principles based on the Leadership in Energy and Environment Design (LEED) standards for any new projects. Administered by the Canada Green Building Council, LEED is a certification tool which provides a framework for constructing green/energy efficient buildings that significantly reduce energy consumption, water use and environmental green house gas emissions.

2.4 Implementation of Eco-Responsive Energy Management Activities

To supplement an overall CDM policy, the Town may wish to consider some of the suggested activities below:

Temperature Setback: Smog / Constrained Electricity Supply Days
During excessive smog days or high energy consumption periods as determined by Environment Canada or the Independent Electricity System Operator (IESO), it is suggested that cooling temperatures be increased at all Town facilities by an additional 2 degrees Celsius in an effort to reduce energy consumption. Some exemptions may apply to leased premises, such as the Courthouse and Community Centre, and where an increase is not practical (i.e. Arena).

After Hours "Lights Out" Program
Similar to Hydro's "Peak Saver Program," the Town is encouraged to promote its commitment to reduced energy use by adopting an after hours "Lights Out" program at all Town facilities. It is recognized that both cleaning schedules and security measures must be taken into consideration.

The Town is encouraged to adopt an after hours "Lights Out" program

Water Conservation Practices
Town should fully implement at all facilities water conservation principles currently promoted with the public. In addition, effort should be made to improve our water loss percentage with possible targets set on an annual basis. (See Appendix B).

Vehicle Fuel Consumption
Town Departments are encouraged to follow responsible fuel efficient practices at all times, including the cessation of any unnecessary idling of corporate vehicles as per Town's anti-idling guidelines

3.0 SPECIFIC POLICIES FOR CAPITAL INVESTMENT

3.1 Energy Management Standard – Central Building Automated System (BAS) Control

Where possible, it is recommended that BAS controls be considered in the future and that they be centralized to monitor building temperatures or flag problem areas quickly. This will ensure temperature control is maintained reliably and monitored from a single location. Part of any assessment to use BAS is the practical return on investment for particular buildings.

3.2 Energy Efficient Lighting & Accessible Design Standards

The Town is committed to replacing or eliminating incandescent lighting by January 1, 2014 (as per recent Provincial legislation) and to continue to evaluate the feasibility of replacing existing street lights with energy efficient technologies.. Also, Town should undertake to apply Niagara Region's Facilities Accessibility Designs Standards (FADS) whenever practically possible. These standards, fashioned after the City of London's 2001 publication, address the needs of persons with disabilities, including, but not limited to, impairments in the following areas: mobility, hearing, vision, dexterity and cognitive.

3.3 Roof Capital Replacement Evaluation

As part of its ongoing roof capital replacement program, the Town should explore the feasibility of using a "Green" (natural cover) or "Light-coloured" roof for Town facilities.

3.4 Energy Efficient Equipment Purchasing

ENERGY STAR® is trusted and a simple source that the Town can use to identify products that are among the most energy-efficient on the market. Only manufacturers and retailers whose products meet the ENERGY STAR criteria can label their products with this symbol. ENERGY STAR in Canada is a voluntary program between Natural Resources Canada's Office of Energy Efficiency and organizations that manufacture sell or promote products that meet the ENERGY STAR levels of energy performance. ENERGY STAR in Canada is administered by Natural Resources Canada's (NRCan's) Office of Energy Efficiency (OEE). Visit online at oee.nrcan.gc.ca/energystar for more information.

3.5 Energy Education and Awareness

Education and awareness programs on energy conservation play an integral role in achieving and sustaining reductions in energy use. By employing a range of educational tools to teach staff and the community about energy efficiency and the benefits of conservation, awareness programs will reinforce the link between individual behaviour, energy use and the potential for savings.

The Town is encouraged to partner with Niagara-on-the-Lake Hydro to organize staff educational workshops and in providing energy conservation material in public display areas, on the Town web site and in other appropriate corporate communications vehicles.

3.6 Electricity Generation, Cogeneration, and District Energy

Generation or cogeneration of electricity or developing district energy projects can be an attractive way of improving efficiency, providing security of supply and reducing environmental emissions. These projects can also be very costly and carry a significant amount of risk and as such need to be thoroughly evaluated both technically and financially against a variety of potential market conditions. This Energy Policy recommends that the Town thoroughly evaluate any future renewal projects of this kind on a case by case basis.

3.7 Back-up / Emergency Power Systems

All new and retrofit back-up/ emergency generation units and equipment will be reviewed for the economic (life cycle analysis), energy efficiency and environmental benefits of converting to newer cleaner fuel options such as natural gas or dual fuel generation units versus existing diesel powered units.

Furthermore, it is recommended that the Town update its Emergency Management Plan which would include the designation of an appropriate Command Centre and that this facility be equipped with a permanent natural gas generation unit.

4.0 SPECIFIC POLICIES ON ENERGY PROCUREMENT

4.1 'Traditional' Energy Procurement

The Town will evaluate energy procurement options on an ongoing basis, taking into account evolving energy requirements, utility supply and rates (electricity, natural gas, water and waste water), energy market regulations and conditions, and the Town's risk profile.

It is recommended that Senior Management consider creating a Procurement Agent Staff Committee which would be responsible for coordinating energy efficient purchases on behalf of all Departments. At a minimum, provisions within this Corporate Energy Policy should be referenced by all Departments when determining purchases of a capital or operational nature.

4.2 Green Power

Green Power can be considered at a later date if necessary to supplement target shortfalls in CDM initiatives.

ACKNOWLEDGEMENTS

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Members	Staff
Councillor Jamie King, Chair	Doug Kerr
Councillor Gary Zalepa,Jr.	Ken Rive
Michael Freel	Dawn McInnis
Melissa Hellwig	Denise Lundy
Tim Callighen	Hans Pauls
Jim Huntingdon	Greg Warner

The Town of Niagara-on-the-Lake Energy Management Committee wishes to acknowledge the contribution and guidance of the Office of Energy Initiatives, City of Hamilton.

APPENDIX A - DEFINITIONS

"CDM or Energy CDM" means Energy Conservation and Demand Management

"Energy Intensity" for purposes of the Energy Policy, is the process of reducing overall energy usage or consumption of a facility or facility operations using a common measure over a specific timeframe. By measuring energy intensity vs. straight energy consumption reductions we are able to account for additions or deletions in the Town's building stock. We can also account for building expansions, changes in the portfolio and correct for seasonal weather variations. Example: Comparing kilowatt-hours (kWh) per square foot of a building between 2005 vs. 2007.

"Facility" shall include all Town owned buildings and grounds e.g. parks and recreation facilities.

"HVAC" means heating, ventilation, and air-conditioning.

"IESO" means Independent Electricity System Operator.

"Life Cycle Cost Analysis" is a method of economic analysis that sums all relevant project costs over a given study period in present-value terms. It is most relevant when selecting among mutually exclusive project alternatives that provide the same functional performance but have different initial costs, operations, maintenance and renewal costs, and/or expected lives:

- Investment-related:
- Acquisition costs
- Replacement costs
- Residual value (resale or disposal cost)
- Operating-related:
- Operation, maintenance, and repair costs
- Energy and water costs
- Contract-related costs (for financed projects)

"MUSH Sectors" include Municipalities, Universities, Schools and Hospitals

"OPA" means Ontario Power Authority

"Operations" Operations is what the Town "does" and how it delivers its "product" to customers or constituents. It is the core of a company's business. Example: Public Works, Water & Waste Water.

APPENDIX B - WATER CONSERVATION PRINCIPLES FOR TOWN FACILITIES

Saving Water Indoors

Refrigerate a pitcher of drinking water rather than running the tap until the water is cold.
Whenever possible, install low-flow faucets in sinks, showers and toilets.
Check for leaks in and around faucets and toilets.

Saving Water Outdoors

- Do not overwater lawns and gardens. Two to three cm of water each week is adequate for a lawn.
- Use a trigger nozzle on a garden hose to control water flow. When washing a Town vehicle, use a bucket, sponge and trigger nozzle instead of a running hose.
- Avoid using sprinklers set at mist or fine spray because water will be lost through evaporation.
- Make sure sprinklers are not spraying water onto a driveway or sidewalk.
- Check irrigation systems and garden hoses regularly for leaks.
- Use native and adaptive plants in gardens because they require less water and are more resistant to local diseases and pests.
- Use rain sensors in garden and lawn areas wherever feasible.