



CITY OF
ST. CATHARINES

Energy Management Plan

June 2014

City of St. Catharines



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CORPORATE COMMITMENT

The City of St. Catharines Energy Management Plan is design to:

- Commit the necessary resources to develop and implement a strategic energy management plan that will reduce our energy consumption and its related environmental impact.
- Recognize our stewardship responsibilities in our use of finite energy resources and to demonstrate leadership, optimize our delivery of services, and enhance the overall quality of life in our community.
- Provide for ongoing energy monitoring and targeting of utility usage.
- Address legislated reporting requirements under the Green Energy Act O.Reg. 397/11.
- Establish Facility operational guidelines and define equipment standards for City staff to follow.
- Set 5 year energy reduction targets.
- Recognize recent energy reduction projects and continue with energy audits of all our major facilities.



1 INTRODUCTION

1.1 Background

The City of St. Catharines, like most Ontario municipalities, is challenged with significant budgetary pressures due to increasing costs and limited levels of capital funding. In terms of energy supply and pricing, reports like the Province's long term energy plan released in December 2013 has raised awareness that energy costs will continue to increase and the impact of these rising prices can be severe to the City and the local economy. The plan states that electricity prices are forecasted to increase an average of 6.6% annually over the next five years and 55% in the next 20 years. The City of St. Catharines spent \$3.8 million on electricity alone in 2013, which will balloon to an estimated \$5.2 million in five years without an active energy reduction plan.

The City of St. Catharines currently spends about \$4.27 million annually on electricity and natural gas. Small increases in energy costs can quickly impact the bottom line. A 3% annual increase in energy prices will escalate the current \$4.27 million into \$7.3 million by 2030.

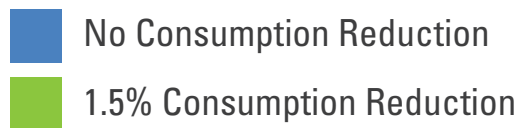
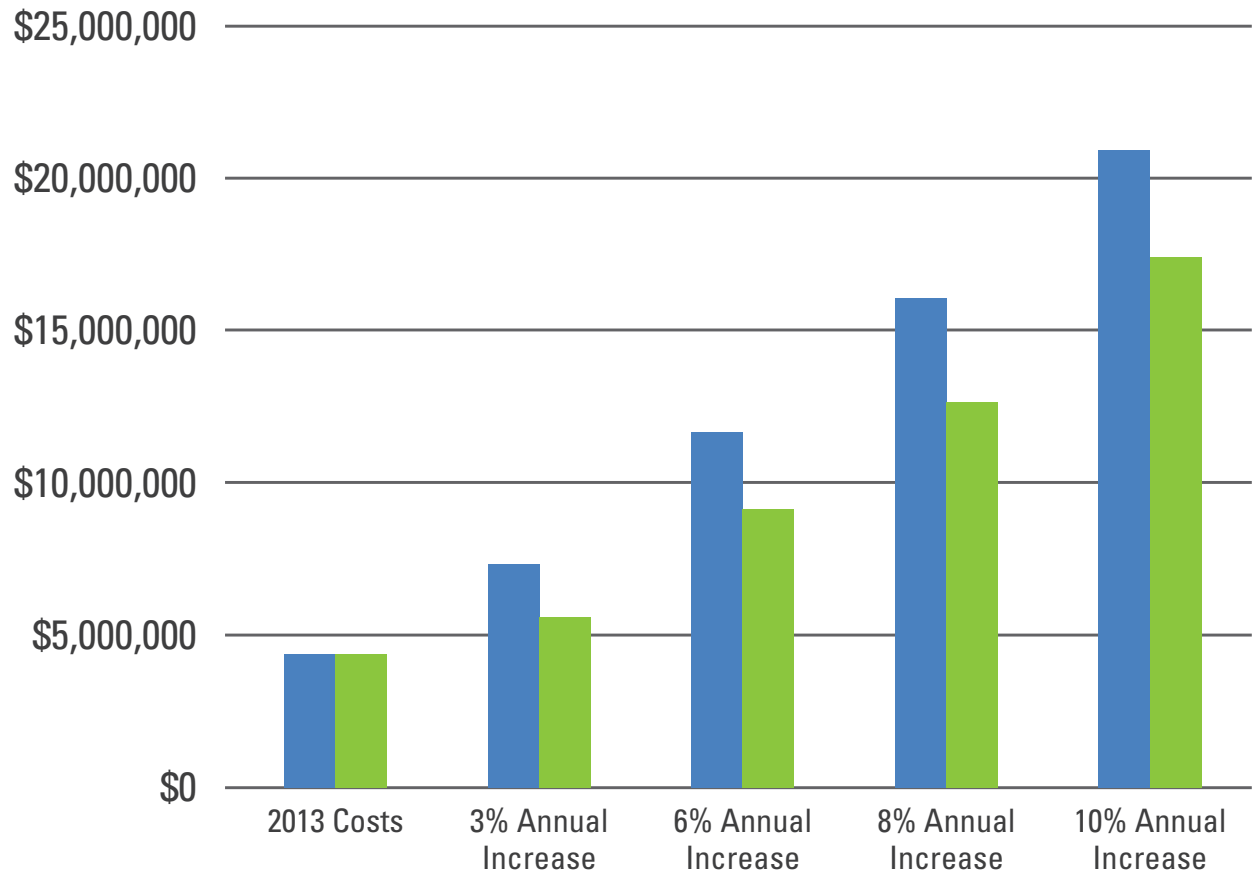
The following graph illustrates the impact of annual increases in energy costs between 3% and 10% (shown by the blue column) and the related increases to the City's current budget, with the same energy consumption each year. The red column incorporates the same price increases, but with a 1.5% energy reduction each year.

If the annual price increase was 10%, 2030 energy costs will be over \$4.5 million less if energy consumption is reduced 1.5% annually.



1 INTRODUCTION

St. Catharines 2030 Energy Cost Projections



1 INTRODUCTION

1.2 Energy Reduction Targets

The key to a successful long term energy conservation and demand management vision is a strong Energy Management Plan, with measurable and achievable targets. The Energy Management Plan calls for targeted energy reductions in energy intensity.

The City of St. Catharines goal is:

 **30% total reduction by 2030 for all facilities**

 **45% portfolio energy reduction overall**

These targets equate to about a 1.5 % reduction in energy per year for the Facilities portfolio. This report recommends that 2011 be used as the base year for measuring results. 2011 has been established as the City's base year that energy reduction results will be measured against, given the fact that accurate energy data is available for 2011, while information prior to 2011 is less reliable.

The City recommends that the 2011 baseline energy consumption, and all energy consumption data in the years following be weather corrected. The two main sources of variance in energy consumption, are weather and use of space, be it occupancy levels or programming changes. The occupancy stays relatively constant in all of the main facilities; weather will be the largest source for variance in the energy consumption. By correcting for weather, it takes the anomalies of any summer heat waves or colder than normal winters out of the equation. The weather correction then allows for year over year comparison given the same weather conditions, and is a much truer metric than simple raw consumption comparisons. By including changes in use and square footage, completely accurate comparisons can be tracked.

The Energy Reduction Target will be applied to each City department or division's overall energy usage on a proportional basis. This means larger energy users in the City must achieve the same reduction on a percentage basis in relation to their 2011 base year consumption. Their overall contribution to energy, cost, and emission reductions will be much larger overall.

1 INTRODUCTION

An important distinction in energy reduction targets are the inclusion of targeted reductions of energy intensity. In this policy, Energy Intensity refers to the total annual ekWhs per square foot of building space consumed by the City Facility portfolio. Over time, some buildings will become obsolete, and new facilities will be built or purchased by the City. As energy reduction targets are compared to the baseline consumption of 2011, there must be a factor for comparison that ensures that year to year comparisons are always fair as a standard “key performance indicator”, an accurate and industry accepted manner of comparison.

1.3 Legislative Compliance

Ontario Regulation 397/11, part of the Green Energy Act 2009, became effective on January 1, 2012. This regulation is aimed at the MUSH sector: municipalities, universities/colleges, school boards and hospitals.

In summary, Regulation 397/11 requires all participants to track, monitor and report all facility energy consumption and greenhouse gas emissions on an annual basis. It also requires an “Energy Plan” be created starting in 2013, which must report on all of the completed and proposed energy conservation measures for all facilities. Creating an internal Energy Management Plan and developing annual and five year targets has now changed from being a voluntary economical and environmentally responsibility to a mandatory requirement.

The Ontario Regulation 397/11 requires all departments within the City of St. Catharines to work together to track, report and reduce energy consumption throughout the facility portfolio.



2 ROLES AND RESPONSIBILITIES

2.1 Leadership Group

The Energy Policy will be led by the Facilities Management Group within the Operations Commission.

Through the Engineering and Construction and Facilities Management groups, potential energy efficient technologies will be explored in all existing, retrofit and new building construction. Special attention will be paid to projects and technologies for which funding is available for local utilities. Building audits will continue to be done ahead of budget processes and capital requests to ensure viable projects are well understood and ready to implement should they be approved. Input from the Sustainability Committee will be solicited to ensure sustainable best practices are explored.

To become and remain relevant, Energy Management must be recognized as a core part of the City's business. Any retrofit or new construction work will consider the energy implications as part of the design process.



2 ROLES AND RESPONSIBILITIES

2.2 Communication of Initiatives

It is important that City Staff and the Community know the on-going work and efforts by the City to lower costs and improve the energy efficiency of its portfolio. The corporate website will maintain an energy section showing the plan, projects that have been completed and their impact. Case studies will keep the site up to date as the work progresses.

Past initiatives include:

- In 2011 the City participated in the Horizon Utilities “Small Business Lighting” retrofit program where qualifying facilities would be eligible for up to \$1,000 of lighting upgrades. This was realized at 38 City owned facilities with a total of approximately \$38,000 in free lighting upgrades.
- In 2012 a \$3,000 Horizon Utilities rebate was granted on a \$13,000 retrofit of variable frequency drives, on an air handler unit, at the Seymour Hannah Sports Complex.
- In 2012 as part of the City Hall electrical upgrade project, LED light fixtures were installed in many areas with occupancy and dimming controls. Total reduction of energy consumption is estimated to be 23 kW.
- In 2013/2014 a re-lighting of the Seymour Hannah Sport Complex was undertaken. 1000 watt HID lights were removed and replaced with 330 watt 3 stage high output fluorescents. Total cost of construction was \$190,000 with an anticipated Horizon Utilities rebate of approximately \$30,000. The reduction in energy consumption is projected to be 67% with a simple payback on investment of just 1.9 years.



3 UTILITY COSTS AND CONSUMPTION

3.1 Tracking Energy Consumption

One of the key components of reducing energy consumption, and completing accurate energy reporting, is to have an effective internal energy management program. This consists of ongoing monitoring and targeting of energy costs and consumption. It is no surprise that an age old saying in the Energy business is that “you can’t control what you can’t measure”. 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. This ongoing monitoring can identify problems and waste at an early stage and allow early correction of the issue. Larger energy using facilities should have “interval meters” in place for electricity consumption. Interval meters track energy usage hourly and allow for hourly, daily or monthly profiles to be created. Currently, only the largest few facilities have interval meters installed, but Horizon Utilities will be replacing the other standard meters with interval meters over time.

3.2 Reporting Utility Consumption

Energy accounting is a cornerstone of an effective energy management program. As it is now a requirement under Ontario Regulation 397/11 to create annual reporting on all energy consumption.

One of the easiest ways to determine energy waste in a facility is by benchmarking similar facilities. If three facilities are relatively similar in size and use, and benchmarking shows that Facility A uses 30% more energy per square foot than Facilities B and C, then Facility A needs to be investigated for energy waste. This can be first be done through analyses of the daily use profiles, which can give clues as to whether the higher consumption is due to operational or mechanical issues. Energy audits can then be performed to isolate the key waste problems, and create a plan to stop the waste.

Regular reporting of energy consumption and costs also brings accountability to all users. It highlights the best and the worst, makes it easier to target which facilities require conservation action, and it also allows for annual operational budgeting to become more accurate.

3 UTILITY COSTS AND CONSUMPTION

3.3 Energy and GHG Emissions (2011)

Facility	Address	Square Footage	Electricity kWh	Natural Gas m3	Green House Gas (GHG) kg	Energy Intensity ekWh/sq ft
City Hall	50 Church Street	70,084	1,071,296	53,383	186,631.02114	23.38107
Lake Street Service Centre	383 Lake Street	77,318	969,422	250,254	550,690.72926	46.93688
Parks and Recreation Main Office	320 Geneva Street	10,888	119,515	22,893	52,843.32391	33.32262
Old Court House	101 King Street	24,150	257,419	14,164	47,372.36083	16.89237
Lakeside Park Carousel Building	2 Main Street	4,539	23,442		1,875.36000	5.16457
Port Weller Community Centre	1 Bogart Street	3,122	71,764	18,200	40,150.53140	84.94220
Russell Ave Community Centre	108 Russell Street	16,485	88,144	7,105	20,484.42484	9.92747
Chetwood Street Senior Centre	117 Chetwood Street	1,122	22,680	5,582	12,367.87991	26.26658
Dalhousie House	Lakeport Road	4,850	8,221		657.68000	1.69505
Dunlop Drive Senior Centre	80 Dunlop Drive	10,627	109,001	29,879	65,210.92413	10.13911
Merriton Senior Centre	343 Merritt Street	24,298	46,882	16,129	34,244.48288	8.98417
Dalhousie Senior Centre	19 Brock Street	3,744	14,853	9,815	19,744.74401	31.82816
Rex Stimers/Jack Gatecliff Arena	8 Gale Crescent	83,848	2,753,314	120,861	448,768.18985	48.15616
Bill Burgoyne Arena	129 Linwell Road	39,638	599,624	58,442	158,461.94313	30.79703
6-8 Academy Street	6-8 Academy Street	8,180	37,095	16,611	34,372.80510	26.11650
Fire Hall #1	64 Geneva Street	13,520	203,190	27,936	69,071.75587	36.98873
Fire Hall #2	190 Linwell Road	3,050	30,454	11,339	23,874.13955	49.49586
Fire Hall #3	285 Pelham Road	3,940	27,850	10,652	22,366.95880	35.80129
Fire Hall #4	14 Walnut Street	4,510	46,283	16,129	34,196.56288	48.27016
Fire Hall #6	465 Scott Street	4,310	35,689	18,777	38,355.42318	54.58162
Fire Hall #5	149 Martindale Road	4,000	96,233	13,227	32,705.96333	59.20165
Ontario Street Parking Garage	8 Ontario Street	145,000	465,363		37,229.04000	3.20940
St. Catharines Public Library: Centennial Branch	54 Church Street	73,382	27,985	98,976	189,365.49795	14.71587
St. Catharines Public Library: Port Dalhousie Branch	23 Brock Street	1,205	598		47.84000	0.49627
Fairview Golf Course Clubhouse	285 Geneva Street	2,325	7,648		611.84000	3.28946
Malcolmson Park Storage Greenhouse	325 Lakeshore Road	600	8,955		716.40000	14.92500
Market Square Building	91 King Street	7,449	54,165	28,857	58,891.02334	48.44285
Morningstar Mills – Gris Mill & Turbine	2710 DeCew Road	1,418.	21,904		1,752.32000	15.44711
Morningstar Mills – House	2710 DeCew Road	1,561	6,925		554.00000	4.43626
Seymour Hannah Four Pad Arena	240 St Paul Street W	133,870	4,745,281	494,379	379,622.48000	35.44693
St. Catharines Municipal Golf Course	37 Lincoln Avenue	2,108	41,015	5,377	13,447.10138	46.56573
Victoria Lawn Cemetery Office	432 Queenston Street	1,892	42,476		3,398.08000	22.45032
Victoria Lawn Cemetery Storage Building	432 Queenston Street	1,588	18,930		1,514.40000	11.92065
Victoria Lawn Cemetery Storage Building #1	432 Queenston Street	1,840	14,320		1,145.60000	7.78261
Happy Rolph's House	2 Northrup Crescent	2,700	19,564	833	3,140.01229	10.52479
16 Ontario	16 Ontario	990	33,437.		2,674.96000	33.77475
18 – 24 Ontario Street	22 Ontario Street	3,960	116,563		9,325.04000	29.43510
Haig Bowl Arena	Pleasant Avenue	32,291	699,655	48,528	158,943.22000	39.17000
Renown Road Storage Building	45 Renown Road	41,100	9,668		773.44000	0.23523
RCS Storage/Workshop & Equipment Garage	320 Geneva Street	2,800	19,392		1,551.36000	6.92571
Transit Commission Building	2012 First St South	69,426	972,818	329,594	700,964.75544	64.46676

4 EQUIPMENT STANDARDS

As part of the on-going operation and maintenance of the portfolio of buildings, equipment is replaced when needed and systems are modernized as needs change. Energy efficient equipment often carries a premium and as such does not fit into a lowest bid scenario. However; when one looks at the life cycle costs and more importantly savings associated with more efficient equipment, a municipality is far better off purchasing the efficient equipment over the long term. Further, if one were to consider only the incremental cost of the more efficient equipment versus a base case , and include the available incentives from various government agencies, the higher costs are typically recovered within a 2 year time frame. This then leaves the benefits and lower operating costs available to the municipality for the remaining 15-20 year life span of the building system.

In light of this fact, the City of St. Catharines proposes the following guidelines to assist departments as they consider capital renewal and / or new construction projects:

4.1 Heating/Cooling Equipment

- Condensing boilers where applicable
- Mid efficiency boilers as a minimum standard
- Variable speed drives on chillers
- Condensing rooftops of new equipment, and where applicable on retrofit

4.2 Controls

- Controls – electronic B.A.S (Building Automation Systems)
- Standardization for a central B.A.S. system throughout the City
- Add buildings on to a centralized system each year where practical
- All sites will have set back temperature capabilities
- Pump and fan retrofits usually will benefit by applying Variable Frequency Drives (VFD's). All such new or retrofit applications will consider the life cycle benefit of VFD's.

4 EQUIPMENT STANDARDS

4.3 Water Management

- New construction requires efficient water fixtures per the building code
- All retrofits will include efficient fixtures including auto flush valves on toilets, urinals and taps.
- Showerheads will be low flow while still maintaining a viable water flow

4.4 Lighting Systems

- Lighting systems to be designed by a qualified lighting consultant
- Phase out all T12 equipment and replace with best alternative
- Phase out all incandescent lighting
- Maintain IES guidelines for all facilities
- Ensure all retrofits include practical switching options to ensure easy shut down
- Application of Occupancy Controls where applicable

4.5 Renewable Energy

- Opportunities for renewable energy generation will be studied and considered on a case by case basis. Should a given option be practical, the City will consider the business case and funding opportunities



5 OPERATIONAL STANDARDS

Building operations are well addressed through ASHRAE publications. These clearly define acceptable conditions for building operation. The City will adhere to these standards as a basis for the operation of their facilities.

5.1 Building Temperatures

- Indoor temperature settings in all spaces during occupied periods will be 22 degrees C during heating season, 24 degrees C during cooling season.
- Temperature set points during unoccupied periods will be 18 degrees C during heating season, 27 degrees C during cooling season.
- Specific sites (labs, rinks, pools) will be addressed as required.
- Occupants that control their own thermostats will adhere to the parameters listed

5.2 Lighting Use During Unoccupied Times

Few items cause more public complaints from the citizens than passing municipal facilities late in the day or at night when they are vacant, yet all of the lights are on. This is a valid issue and a simple item to address with a coordinated effort. It requires little to no cost and will save a considerable amount of energy over the long term.

As such, all departments and facilities will consider their method of shutting down the site to ensure such complaints come to an end. An education campaign will occur to ensure building operators, occupants, cleaning, security and maintenance staff are aware of the effort and comply with the directive.

5.3 Other Equipment

- To avoid scalding, hot water tanks will be kept at 50 degrees C
- CO2 levels will be maintained according to ASHRAE standards

All standards referenced will meet or exceed building code requirements and good operational and maintenance practices.

6 PLANNING

6.1 Responsibility

The administration and implementation of this plan is the responsibility of all City staff. In order to sustain a corporate culture of conservation, staff must be engaged in an effective awareness and education program. Although the Facility Management Team has the lead responsibility in ensuring city facilities operate efficiently, all City staff should be familiar with and utilize energy efficient measures where possible

6.2 Energy Audits

The first step in implementing an energy management plan is the completion of energy audits for corporate facilities. Audits involve a technical review of a facility and its operations, the development and analysis of a baseline energy profile for the facility and identification of energy management opportunities and savings.

Another important component of an energy management program is the re-commissioning of City facilities. Over the life cycle of a facility, the mechanical building automation and distribution systems are adjusted from day-to-day to suit user room temperature requirements. Moreover, mechanical distribution or building controls instrumentation is sometime over-looked when renovations take place. Re-commissioning involves examining the original mechanical design and operating specification against any building renovations and recalibrates the settings to suit today's energy efficient standard practices. It also ensures that mechanical operating practices are current and appropriate to maximize building system efficiencies.

The use of renewable energy measures can also help reduce overall corporate greenhouse gas emissions by lessening our demand for fossil fuel generated energy (oil, gas or coal). The investment for these types of measures can be significantly greater than conservation initiatives and therefore, should be considered on a case-by-case basis through a cost and environmental benefits analysis. However, it is acknowledged that the use of technologies such as wind, solar and geothermal can show community leadership and help raise awareness of the benefits of utilizing renewable energy.

6 PLANNING

6.3 Evaluation

As part of any energy management strategy, continuous monitoring, verification, and reporting is an essential tool to track consumption and dollar savings and/or avoidance as the result of implemented initiatives.

As part the Energy Management Plan, the implemented processes improvements, program implementation and projects will continue to be documented, reviewed, and reported on annually to update consumption savings. By regularly monitoring and reporting consumption and dollar savings and/or avoidance to Departments, the outcomes of their participation in energy management initiatives can be demonstrated, and feedback can be obtained for any new ideas.

This monitoring and reporting will also align with the requirements of the Green Energy Act's Conservation Plans to develop energy conservation plans which would include a high level description of how the Corporation will conserve energy and reduce demand over the life of the plan, as well as a forecast of the expected results. The City of St. Catharines will review this plan annually to ensure reduction targets are met. Full review of the entire plan will be in 5 years' time (2019).

