



Hamilton
Public Works

CORPORATE ENERGY POLICY

Corporate Energy and Energy Commodity Policies

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EXECUTIVE SUMMARY

The City of Hamilton's (City) first Corporate Energy Policy (PW07127) was created and adopted by Council in 2007. This policy called for a review after five (5) years. The City of Hamilton's revised Corporate Energy Policy calls for new corporate energy intensity reduction targets of 45% in 2030 and 60% in 2050. Achieving the proposed 2030 targets alone is anticipated to deliver an additional \$50 million in revenue, direct energy savings and avoided costs. Meeting these targets will put Hamilton on track to become a net zero carbon municipality.

The City's Corporate Energy Policy is integral to the success of meeting the environmental emission targets adopted by Council through the Board of Health (BOH) Climate Change Actions 2012 Report (BOH13024). The BOH report calls for an 80% reduction in Green House Gas (GHG) emissions by 2050. This result can be achieved through a combination of energy conservation and demand management, renewable energy supply and through the purchase of environmental offsets e.g. carbon credits. The City's revised energy and emission targets are outlined in the table below.

Table 1: Corporate Energy Intensity and Emission Reduction Targets

Year	Energy Policy Reduction Targets	Emission Reduction and Offset Target
2020	Initial 20% (using 2005 as base year)	20%
2030	45%	50%
2050	60%	80%*

**Note: The Board of Health (BOH) Climate Change Actions 2012 Report (BOH13024) target reduction of 80% Greenhouse Gas Emissions has been approved by council. It is recommended an interim target of 50% by 2030 be adopted as part of this report.*

In 2008, the City created and approved the City's first corporate Energy Commodity Policy (PW08144/FCS08114). The energy Commodity Policy has been combined with the Corporate Energy Policy into one cohesive policy document for ease of reference, as they are closely related, managed and reported on by the Office of Energy Initiatives. The focus of this policy continues to be on corporate energy, dealing with City owned assets.

The City of Hamilton's Corporate Energy Policy is designed to:

- Facilitate the achievement of City-wide energy and emission reduction targets;
- Address legislated reporting requirements e.g. Green Energy Act;
- Define policies for capital investment related to energy;
- Define policies related to energy procurement;
- Address regulations concerning greenhouse gases (GHG) emissions.

The City of Hamilton's Corporate Energy Policy incorporates the following key components:

Corporate Energy Steering Committees

- Facilities;
- Hamilton Water.

Mitigation of Energy and Fuel Consumption

- Energy Reporting and annual Energy Management Planning;
- Conservation and Demand Management Investment: (Existing Buildings);
- Conservation and Demand Management Investment: (Major Renovations / New Construction);
- Implementation of other Energy and Fuel Management Policies.

Specific Energy Policy Actions

- Base Building Standards;
- Project Approval Processes;
- Incentive/ Funding Programs, Life Cycle Analysis;
- Sustainable Building Policy;
- GHG Emissions, Reporting And Protocol;
- Fuel Reduction Targets;
- Energy Reserve;
- Energy Efficient Lighting;
- Building Automation Systems;
- Energy Efficient Equipment;
- Generation, Cogeneration, District Energy And Renewable Energy;
- Emergency Generators And Back-Up Power Systems;
- Monitoring And Verification;
- Building Labelling;
- Energy Procurement.

Energy Commodity Policy

- All Energy specific purchasing related to the: commodities, sales, delivery (rates) and storage of energy commodities including hedging agreements;
- Retaining Contract Agents (consultants) for energy related services.

Boards and Agencies:

- All City Boards and Agencies are encouraged to adopt the revised policy and actively participate towards the stated reporting, targets and goals.

Significant New Policy Additions – Fuel and Hamilton Water:**Fleet and Transit Fuel Consumption**

Historically the City of Hamilton corporate vehicles travel roughly 30 million kilometers per year in order to provide fleet and transit services. Fuel consumption, in the form of diesel, unleaded gasoline and compressed natural gas (CNG) represents a \$16 million spend and produces 40% of the corporate greenhouse gases.

Corporate Average Fuel Economy (CAFE) is the traditional method for measurement of the fuel consumed per 100km of vehicle and is used to monitor improvements in fuel consumption efficiency and fuel management activities.

Considering that the current CAFE for diesel is 54L/100 km and 21L/100 km for gasoline, a 20% reduction in fuel economy by 2030 is hereby being issued as a long term target. Reaching this level of improvement will be achieved through new technology that emerges for fit-for-purpose fleet vehicles, new vehicles with better engine/drive technology can be acquired and the horsepower requirement for fleet needs can be reduced over time.

The Central Fleet Policy speaks to managing fuel and efficiency of the vehicles through purchasing and operator training. Furthermore, the City has an Anti-idling By-law that assists in reducing fuel consumption.

Hamilton Water

Energy use by Hamilton Water facilities and operations accounts for approximately 34% of the City's energy use and 30% of the associated costs. It is the City's single most significant cost and represents the single highest potential opportunity for conservation.

Opportunities for improving energy efficiency fall into three general categories:

1. Equipment upgrades;
2. Operational efficiency;
3. Modifications to facility buildings.

To move forward with energy efficiency improvements for Hamilton Water, this Energy Policy establishes the metrics and targets for measuring and achieving success.

- The base year for reporting results will be 2011;
- Energy intensity will be reporting in terms of kWh/MLD;
- Energy intensity for different stages of water processing will be developed. These will include extraction, pumping, treatment and support systems;
- Green House Gases and emissions will also be reported on a Tonnes CO₂ e /MLD basis according to the different stages of water processing (e.g. extraction, pumping, water treatment).

1.0 INTRODUCTION

1.1 Purpose of the Energy Policy

While there are many areas of crossover between the Corporate Energy Policy (CEP) and the Energy Commodity Policy, the purpose of each is distinctive and specific.

The purpose of the CEP is to provide City staff and external stakeholders with a set of guidelines and protocols to assist in the making of decisions or choices relative to energy using equipment, processes, systems and activities. The intent for these guidelines, once they are implemented will lead to further energy reduction and further emissions reduction which will result in a direct benefit the City of Hamilton financially and environmentally.

The Energy Commodity Policy is intended to provide the framework necessary to allow The City of Hamilton the means to procure the necessary quality and quantity of energy commodities in an efficient, timely, and cost effective manner, while maintaining the controls necessary for a public institution in accordance with the Energy Commodity Policy.

1.2 Corporate Energy Steering Committee

The formation of a Corporate Energy Steering Committee (CESC) was an important tool in the early success of the original Energy Policy. The CESC provides a vehicle for key staff to work together in developing energy plans and strategies from each of their divisions. The CESC will continue to have lead responsibility and accountability for achieving future energy reduction targets. The recommendations for the CESC committees are as follows.

1. A CESC will be created for Hamilton Water and a separate CESC created for the City's Facility portfolio. Each committee shall consist of key representatives from within the division including Directors, Managers and other members of the management team as well as project managers, advisors e.g. Office of Energy Initiatives and Facilities Management & Capital Programs.
2. Each CESC will oversee the development of respective divisional Energy Conservation and Demand Management Plans and budgets for achieving targeted results.
3. Each CESC will monitor energy intensity, where applicable, to address areas of concern, promote best practices and develop measures for efficiency improvement that will be implemented by operations staff.
4. The Public Works, Office of Energy Initiatives will be responsible for reporting on all City of Hamilton corporate energy consumption reductions, cost savings initiatives and associated environmental emission reductions associated with energy conservation and demand management on an annual basis at a minimum and as required by legislation of the Green Energy Act, 2009.
5. All City Departments and participating Boards and Agencies will be responsible for reporting on all energy incentive funding, project cost, energy consumption reductions,

cost savings initiatives etc., and all other activities associated with energy conservation and demand management as requested by the OEI.

1.3 Green Energy Act, 2009

The Ontario Green Energy Act (GEA), formally Bill 150, Green Energy and Green Economy Act, 2009, that was introduced in the Ontario legislature on February 23, 2009, is intended to expand renewable energy production, encourage energy conservation and create “green” jobs.

Regulation 397/11 under The Green Energy Act came into force January 1, 2012 requiring public agencies to report their annual energy use and GHG emissions to the Ministry of Energy. The regulation affects specific public agencies including municipalities, municipal service boards (for water/sewage pumping and treatment operations), universities, colleges, school boards and hospitals. As of July 1, 2013, every public agency was required to submit to the Minister, publish on its website and intranet site and make available to the public in printed form at its head office, the public agency’s Energy Consumption and Greenhouse Gas Emission Template for operations conducted in 2011.

This reporting standard forms a basis to not only meet regulatory requirements, but also set a focused path forward in developing and achieving the goals and targets of the Corporate Energy Policy and City of Hamilton Energy Management Plan (EMP) that will also align with the goals, targets and spirit of Vision 2020, the City of Hamilton’s vision of a strong, healthy, sustainable future and the City Strategic Plan.

It is important that all City departments comply with utility information requests from the OEI so that all project and energy information is recorded for future verification and reporting to Council and as part of the Green Energy Act requirements.

1.4 Energy Reporting and Energy Management Plans

At least once every year, energy consumption, energy intensity and energy costs will be reported to City council describing the performance of the City’s energy program. The reporting requirements are defined and driven largely by the Green Energy Act, which speak to annual reporting and using 2011 as a base year. These reports are to be posted on the City web site.

As required by the Green Energy Act, an annual plan for energy management will be prepared by City staff to outline the actions taken to reduce and optimize energy use throughout all City departments.

2.0 MITIGATION OF ENERGY CONSUMPTION

Building on the success of the Energy Policy to date (20% energy intensity reduction by 2013); it is necessary that the City continues to move forward with its energy strategy. The City 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 Energy Management Policies related to Renewable Energy, Environmental Impact and District Energy;
5. Optimization of energy use by Hamilton Water;
6. Prudent management of energy commodity purchasing;
7. Annual reporting on energy use, energy intensity and Energy Management Plan.

2.1 Building Environmental Standards

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.

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

Policy Actions – Base Building Minimum Standards

- Indoor temperature settings will follow ASHRAE standards for indoor temperature target of 22 C. All spaces during occupied periods will be set at 22 degrees Celsius (72°F) during the winter and 24 degrees Celsius (75°F) during the summer. Where available, occupants will be given the temporary capability of varying temperature +/- 1 degree Celsius (2°F), resulting in 21-23°C (70-73°F) for heating and 23-25°C (74-77°F) for cooling.
- Indoor temperature settings in all spaces during unoccupied periods will be set at 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.

Spaces, such as research facilities, requiring critical temperature settings will be more tightly controlled and will be addressed as exceptions to the Corporate Energy Policy where necessary.

Occupants who control their own thermostats are required to adhere to these temperature standards also. In City leased office spaces, temperature conditions for occupied and unoccupied period within the Energy Policy should be established as part of building lease agreements.

A performance standard must be measurable and quantifiable. The following are examples of standards of performance for City of Hamilton buildings:

Policy Actions – Base Building Minimum Standards

- Desirable domestic hot water tank temperature (e.g. 50°C).
- Minimum light levels in offices, hallways, storage areas, etc. (e.g. 400 LUX).
- Maximum CO₂ level in offices, resident spaces, etc. (e.g. 700 ppm above ambient)
- Fan operation: when outdoor air temperature permits, provide free cooling any time the outdoor temperature is below the required system supply temperature outdoor air intake dampers are to be optimized for energy efficient operation while maintaining indoor air quality.
- When it comes time to evaluate energy efficiency measures (e.g. lighting retrofits, control of fresh air volume using CO₂, etc.), these should provide useful guidelines that can be adopted with OEI approval.

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

2.2 Existing Buildings

Conservation and Demand-Side Management (CDM) Activities include efficiency upgrades to energy consuming systems. CDM Retrofits tend to be initiatives where a new energy efficient technology or group of technologies are added or retrofit within a facility or group of facilities. These measures can benefit the City through:

- Reduced Energy Demand & Consumption
- Reduced Energy Costs
- Reduced Environmental Emissions
- Reduced Maintenance Costs and improved reliability
- Reduced Exposure to Energy Market Volatility (Risk Mitigation)
- Improved Working Environments
- Improved Productivity

2.3 Retrofits and Capital Renewal/Life Cycle Replacements

Capital Renewal/ Life Cycle Replacements are generally managed by the division who carries responsibility for operating and maintaining the existing or original equipment e.g. *Public Works, Facilities and Capital Planning*. Typical projects include major capital replacements of chillers, boilers, roofs, windows, fans, pumps, piping etc. The intent is to make CDM part of the City's normal course of business for all facility and operational retrofits, including capital renewal and life cycle replacements projects.

Policy Actions - Project Approval Process

This policy mandates OEI involvement in the review of projects at the earliest possible stage. OEI approval of projects will only be given with appropriate review and life cycle analysis. This ensures that options for improving energy efficiency are considered, evaluated and quantified in terms of life cycle costing analysis, including cost, maintenance and emission reductions.

Projects can continue to be managed by the division who carries responsibility for operating and maintaining existing or original equipment or the OEI can take the project lead as required (lighting, Building Automation Systems, renewable energy or new technology applications).

Typical 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 phases:

1. Project Identification & Feasibility - Energy Audits, Feasibility Analysis or 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, report achievements.

Policy Actions – Incentive / Funding Programs, Life Cycle Analysis, Approvals

The OEI will be a resource for implementation and follow-up of the recommended five (5) step process (below). In the following recommendations all facility and operational CDM retrofits and capital renewal/ life cycle replacement projects are required to adopt the following procedures.

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

Incentives funding opportunities for CDM projects and feasibility studies are available.

Most government and utility funding programs are designed to encourage greater levels of energy efficiency or CDM activities which would not have been normally achieved without these funds. As new energy efficient product costs decline or become more cost effective due to higher utility rates, and as design techniques become main stream, through code changes or reduction targets achieved, funding for these activities will likely be reduced or eliminated altogether. It should be noted that all funding programs are established with a defined or limited

budget. Typically it is the early adopters that reap the largest subsidies as programs change or have short shelf life before they expire. The main goal is to ensure we secure all eligible incentives.

Identify all potential utility or government funding (incentives) for CDM feasibility studies; potential utility or government funding (incentives) for CDM retrofit/ renewal; projects; Application process; Eligibility criteria; Steps to securing funding.

Some funding programs are prescriptive (product specific) while others consider custom measures, often requiring detailed engineering analysis. In some cases a feasibility study may be necessary.

It should be noted that most government and utility incentive /funding programs will NOT provide incentives for project feasibility studies or CDM retrofit / renewal projects that have been initiated prior to application approval. Pre-approval of incentive based projects before the project is initiated is the norm.

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.

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 – see definitions)
- Energy/ utility costs and savings
- Maintenance and operational savings
- Impact with and without financial incentives or funding.

Energy rate escalators should be factored in using most recent data and forecasts.

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) Provide Project information to the OEI

Project information will be used by the OEI for tracking, monitoring and verification for reporting to City Council and Senior City Management, including incentives.

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

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

2.4 Major Renovations and New Construction

Major Renovations are similar to new construction in that they involve major capital and planning involvement. The renovation of Hamilton's City Hall is an example of a major renovation project that falls under this category and was awarded The Outstanding Building of the Year (TOBY) - National, from the Building Owners and Managers Association for 2011. The award is based on building standards, community impact, energy conservation, environmental, regulatory and sustainability, emergency preparedness & security standards and the training of building personnel.

New Construction projects involve the complete design, development and construction of a new facility.

2.4.1 Evaluation of LEED and Green Building Design Options – Major Renovations and New Construction of City Owned Buildings

To promote energy efficiency and environmentally friendly building practices, the City of Hamilton encourages LEED (Leadership in Energy and Environmental Design) design where practical. LEED construction will be compared to other options using Life Cycle Costing to assist on deciding whether the City wishes to use LEED or other alternatives.

LEED is a green building certification tool administered by CaBGC (Canada Green Building Council), which provides a framework for constructing green/ energy efficient buildings. LEED Canada NC 1.0 for New Construction and Major Renovations (launched in 2004) rating system addresses the performance of commercial and institutional buildings.

Many municipalities are starting to explore LEED certification for their own buildings. Some municipalities have even adapted standards such as minimum LEED Silver rating for all new municipally owned new construction projects. Considering LEED for new construction and major renovations makes good business sense, in that a high performance green building vs. conventional inefficient buildings can reduce energy consumption by 25% to 75%, water use reduction by 20% to 50% and reduced environmental greenhouse gas (GHG) emissions by as much as 60%.

The City's policy will address all new and major renovated City owned buildings over 500 m², identify options and costing them to meet or exceed the gold level of the LEED New Construction rating system. Major renovations of occupied facilities must meet or exceed either the certified level of the LEED® New Construction rating system or the silver level of the LEED Commercial Interiors rating system. Minor renovations, unoccupied buildings, landscape/non-building infrastructure, and projects less 500m² will be directed to follow The City of Hamilton's Corporate Energy Policy Section 2.5.

Policy Actions – Sustainable Building Policy

The City of Hamilton's Sustainable Building Policy is outlined below inclusive of items 1) through 5) below, Table 1, ending at Section 2.5.3.

- 1) Major Renovations (>50% gross floor area) - All major renovations of City owned facilities will require a life cycle cost assessment of the energy, financial and environmental benefits associated with:
 - a. Base case design
 - b. LEED Certified design
 - c. LEED Silver design
- 2) New Construction - All new City facilities to be constructed will require a life cycle cost assessment of the energy, financial and environmental benefits associated with having the building constructed according to :
 - Base case design;
 - LEED Certified design;
 - LEED Silver design;
 - LEED Gold design;
 - LEED Platinum design.
- 3) Evaluation of Energy Performance Upgrades - All major renovations and new construction projects will require evaluation of energy efficiency upgrades compared to the base case design standard. The base case design standard is the minimum level of energy efficiency that must be achieved as defined under LEED® Canada NC 1.0 for New Construction and Major Renovations and its subsequent addendums.
- 4) Evaluation of Renewable Energy Options -Options for renewable energy are to be evaluated. This will provide the City detailed information on the viability of renewable energy projects in the context of the overall project. The project evaluation shall investigate supplying using at least 5%, 10% and 20% renewable energy vs. the buildings total energy use, as per LEED® Canada NC 1.0 for New Construction and Major Renovations.
- 5) Evaluation of Green & White Roofs - Options with respect to green and white roofs (or cool roofs which reflect heat) are to be evaluated as a potential LEED credit and provide information in terms of energy, water / sewage infrastructure or system benefits, financial, environmental benefits and overall viability in relation to the overall project.

These standards will apply to City owned buildings in excess of 500 square meters (5,000 ft²). Buildings below 500 square meters are to follow the recommendation outlined in Section 2.5.1 and 3.6 of this report for CDM Retrofits/ Initiatives & Capital Renewal/ Life Cycle Replacement Projects.

Table 2: Sustainable Building Classifications

	Space	LEED Gold	LEED Certified	Corporate Energy Policy (Section 2.5)
New Construction	>500m ²	✓		
	<500m ²		✓	
Major Renovations	>500m ²	✓		
	<500m ²			✓
Other Renovations	>500m ²			✓
	<500m ²			✓

2.5 Occupied Spaces Energy Management Policies

The following supplemental policies will apply for all buildings with occupied spaces that provide basic environmental services.

2.5.1 Temperature Setback: Smog / Constrained Electricity Supply Days

During smog days or electricity supply constrained periods which are typically associated with the highest peak price for energy, cooling season temperatures will be increased an additional 2 degrees Celsius in an effort to reduce energy consumption.

2.5.2 After Hours 'Lights Out' Program

The City encourages the Lights Out effort for all applicable buildings where this can be integrated without concern for safety. There are two challenges to overcome with a lights out program. The first is technological, the second is cleaning schedules. Given this:

- The City will work towards phasing in automated lighting control upgrades on City facilities as budgets allow, so that the City can lead by example by automatically turning off unnecessary lighting in City owned facilities after hours when the buildings are unoccupied. The use of motion control will be widely integrated.
- Where manual lighting controls exist in facilities, staff will continue to educate security guards, cleaning staff and maintenance staff on the importance of lighting only areas that are necessary during unoccupied periods.

2.5.3 Leased Office Spaces – Terms for Leases

In City leased office spaces, temperature conditions for occupied and unoccupied period within the Energy Policy should be established as part of building lease agreements and should comply with Section 2.1 of this policy.

3.0 EMISSIONS AND GREENHOUSE GASES

3.1 GHG Targets

Policy Actions – Greenhouse Gas (GHG) Emissions

The City of Hamilton's Corporate Energy Policy is integral to meeting the greenhouse gas emission reduction target of 80% by 2050 relative to 2005 base year. This target was set and supported by Council with the Board of Health Climate Change Actions 2012 report (BOH13024).

3.2 GHG and Emissions Reporting

Policy Actions – Annual GHG Reporting

Reporting of the corporate and Hamilton community emissions will be coordinated and carried out by the Office of Energy Initiatives at least once a year. The results will be compiled and presented to City Council via an Information Report.

3.3 GHG Protocol

Policy Actions – GHG Protocol

The City of Hamilton will comply with the GHG protocol as the basis for its emissions calculations and in order to assess its carbon footprint.

The Greenhouse Gas Protocol (GHG Protocol) is the most widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas emissions. The GHG Protocol, a decade-long partnership between the World Resources Institute and the World Business Council for Sustainable Development, works with businesses, governments, and environmental groups around the world to build a new generation of credible and effective programs for tackling climate change.

It provides the accounting framework for nearly every GHG standard and program in the world - from the International Standards Organization to The Climate Registry - as well as hundreds of GHG inventories prepared by individual companies.

3.4 Validation and Verification

All carbon and emission reductions will be held in title by the City of Hamilton and will be managed by the OEI. This includes the calculation, validation and verification of any carbon, greenhouse gas or other environmental attribute that can be monetized.

4.0 FLEET & TRANSIT FUEL CONSUMPTION

Historically the City of Hamilton corporate vehicles travel roughly 30 million kilometers per year in order to provide fleet and transit services. Fuel consumption, in the form of diesel, unleaded gasoline and compressed natural gas (CNG) represents a \$16 million spend and produces 40% of the corporate greenhouse gases.

Table 1: Energy and Emissions from Transportation Fuels

Portfolio	Cost (\$) 2012	Liters DLE*	GHG Tonnes CO ₂ e
Transit	\$11,290,400	10,913,868	29,933
Police/Fire/EMS	\$1,362,000	1,196,275	3,281
Central Fleet	\$103,100	91,264	250
O&M	\$3,092,200	2,859,211	7,842
Hamilton Water	\$448,100	398,813	1,094
Total	\$16,296,000	16,865,334	42,400

DLE=Diesel Liter Equivalent (conversion to Diesel equivalent)
CO₂e = Carbon Dioxide equivalent

Corporate Average Fuel Economy (CAFE) is the traditional method for measurement of the fuel consumed per 100km of vehicle and is used to monitor improvements in fuel consumption efficiency and fuel management activities.

Policy Actions – Fuel Reduction Targets

Considering that the current CAFE for diesel is 54L/100 km and 21L/100 km for gasoline, a 20% reduction in fuel economy by 2030 is hereby being issued as a long term target. Reaching this level of improvement will be achieved through new technology that emerges for fit-for-purpose fleet vehicles, new vehicles with better engine/drive technology can be acquired and the horsepower requirement for fleet needs can be reduced over time.

Table 2: Corporate Average Fuel Economy (CAFE)*

Year	2005	2006	2007	2008	2009	2010	2011	2012
Total KM all Fuels (000's)	28,140	29,125	28,578	29,512	30,705	30,048	29,326	29,990
Total DLE (000's)	14,278	13,907	14,316	14,368	14,003	13,759	14,011	13,864
DLE /100KM	50.7	47.8	50.1	48.7	45.6	45.8	47.8	46.2
Unleaded (L/100KM)	24.4	24.7	25.2	23.9	23.1	21.8	21.1	20.7
Diesel (L/100KM)	56.8	49.5	57.3	55.5	51.1	51.4	55.5	54.5
CNG (DLE/100KM)	72.5	74.9	73.9	75.0	62.8	66.4	68.9	66.2

DLE = Diesel Liter Equivalent – conversion of Compressed Natural Gas (CNG) and Unleaded gas to Diesel equivalent.

* Excludes Fire, Police and EMS as well as consumption and use of dyed diesel. Vehicle classes vary significantly (ie. sweeper's vs pickup trucks).

The Central Fleet Policy speaks to managing fuel and efficiency of the vehicles through purchasing and operator training. Furthermore, the City has an Anti-idling By-law that assists in reducing fuel consumption.

Recognizing that the North American natural gas markets have changed significantly with the advancement of shale gas recovery, the City has initiated an evaluation of the conversion of transit vehicles from diesel fuels to compressed natural gas (CNG) fuels. Implementing such a program will have a significant impact on reducing operating costs and have a favorable impact on GHG emissions as well.

Distance driven using CNG, Bio-fuels or any other alternate fuels be recognized as part of the fuel and GHG reduction strategy.

5.0 HAMILTON WATER

Energy use by Hamilton Water facilities and operations accounts for approximately 34% of the City's energy use and 30% of the associated costs. It is the City's single most significant cost and represents the single highest potential opportunity for conservation.

Reducing energy at Hamilton Water can be accomplished through measures such as water conservation, reduction of water loss, storm water reduction, and sewer system repairs to prevent groundwater infiltration. Implementing measures to address these items lead to reductions in energy use and result in savings due to recovering and treating lower quantities of wastewater and treating and delivering lower quantities of water. At all times water quality remains the primary objective.

Opportunities for improving energy efficiency fall into three general categories:

4. Equipment upgrades;
5. Operational efficiency;
6. Modifications to facility buildings.

Equipment upgrades focus on replacing items such as pumps and blowers with more efficient equipment. Operational efficiency involves optimizing the amount of energy required to perform specific functions, such as wastewater treatment. Modifications to buildings, such as installing energy efficient lighting, occupancy control and efficient heating and cooling equipment reduce the amount of energy consumed by the buildings themselves.

Policy Actions – Hamilton Water Monitoring and Targeting

To move forward with energy efficiency improvements for Hamilton Water, this Energy Policy establishes the metrics and targets for measuring and achieving success.

- The base year for reporting results will be 2011;
- Energy intensity will be reporting in terms of kWh/MLD;
- Energy intensity for different stages of water processing will be developed. These will include extraction, pumping, treatment and support systems;
- Green House Gases and emissions will also be reported on a Tonnes CO₂e /MLD basis according to the different stages of water processing (e.g. extraction, pumping, treatment).

An overall strategy and energy management plan that addresses the energy use at Hamilton Water will be developed and put in place to lower energy intensity. This strategy will examine energy used for conveying of water, distribution of water, water treatment and waste water processes and further refined to suit Hamilton Water's business units.

Included in the Hamilton Water energy strategy will also be the development of renewable energy opportunities that consider various waste streams such as bio-solids, source separated organics and other organic waste streams generated within the City as feedstock for renewable energy generation. Through this policy, the Office of Energy Initiatives will be consulted and

provide life cycle analysis to evaluate these opportunities and leverage any available incentives.

As with other City of Hamilton renewable energy projects, the ownership and operation will be assessed such that the business case and other financial considerations that may benefit the City, include the option to have the OEI manage and operate the facility in a similar role to other existing operations (HRPI, Biogas, District Energy projects or Solar).

6.0 DISTRICT ENERGY

While the adoption of this policy is focused on Corporate Energy usage, the City will also continue to work through the Hamilton Utilities Corporation – Joint Advisory Committee (HUC-JAC) to investigate opportunities for growth of district energy in targeted areas of the City to enhance economic development, improved reliability, energy efficiency and foster further GHG emission reductions. District energy provides for local, clean, renewable and embedded energy systems which support energy efficiency solutions that are integrated with other City planning processes. District Energy systems are also an excellent solution to integrated community energy planning. District Energy offers a sustainable energy solution to address future Regional Energy Planning needs.

7.0 HAMILTON RENEWABLE POWER INC. (HRPI)

The OEI will work in close association with HRPI to advance the development and growth of renewable energy for the City of Hamilton.

The City of Hamilton shall implement strategies with HRPI to identify opportunities which exist in the generation of renewable energy. Including initiatives which will reduce greenhouse gas emissions maximize revenue generation for the City of Hamilton and provide a sustainable atmosphere for energy renewal initiatives. This includes accessing incentives, participation in the assessment of alternatives and the operation and management of any installation.

8.0 SPECIFIC POLICIES

8.1 Energy Reserve

The Energy Reserve was originally established to permanently fund the OEI as well as other initiatives related to energy conservation and demand management (CDM). The Energy Reserve is created to fund the following activities:

- Fund the Public Works, Office of Energy Initiatives;
- Payback capital outlay;
- Mitigate energy cost increases or budgetary shortfalls during the current budget cycle;
- Energy audits and feasibility studies;
- Pilot projects for new energy technologies and renewable energy projects;
- Fund incremental retrofit project costs of higher efficiency options;
- OEI website, educational and energy awareness programs.

From the previously approved council report, Corporate Energy Policy (PW07127):

- As savings in energy expenditures are identified, whether through reduced rates or energy CDM initiatives, it is proposed that the total amount of savings be base-transferred from the corresponding energy line (e.g. Hydro, Natural Gas) to the Office of Energy Initiatives.
- The OEI is also very involved in reviewing historical billings from all energy suppliers. Under the microscope and with the group's specific knowledge and experience, the OEI has identified and will continue to identify, errors that have been made by these suppliers. These efforts will result in recoveries of past overpayments. Recoveries from the previous budget year flow to the Energy Reserve, to be used as a source of funding.
- The OEI continues to identify sources of incentive funding for retrofit and other energy conservation initiatives. These incentives provided by energy suppliers and various levels of Government will help to mitigate the cost of improvements that will reduce the use of energy. These monies will be applied to the specific project approved for funding. However, if a specific project is not identified, these monies will be transferred to the reserve to be used for conservation projects in general.
- Once the budget base for the Energy Reserve is established, all future savings in current energy expenditures could result in levy savings or could be used to fund further energy initiatives or both. Historic billing errors would continue to be directed to the Energy Reserve to fund future projects and Incentive payments would continue to be used to reduce the cost of conservation projects.
- In regards to City Boards and Agencies, the OEI will provide services on a contract and/or consultant basis. Any savings generated and proposed to be transferred to the Energy office, will be negotiated between the Office of Energy Initiatives and the Board or Agency.

Policy Actions – Energy Reserve
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The Energy Reserve (112272) funds staffing costs for the OEI. In order to maintain a healthy reserve and secure the best leverage for funds on energy related projects, the energy reserve will also be used to fund specific and targeted projects or activities, as approved by the Manager, OEI to ensure compliance with the Corporate Energy Policy.

Funds that are attributed to any energy conservation demand management program, renewable energy revenues, energy related project revenues (e.g. leases or other payments), utility bill recovery (current year recoveries will be returned to client budget, previous year recoveries will go to reserve), carbon off-sets, demand response revenue and all utility incentives will be deposited into the Energy Reserve. In addition, revenue from renewable energy projects (solar lease or other) or fuel procurement (compressed natural gas or other) will be established as a means of funding the ongoing activities required to manage these energy related services. Future operational budget savings will be transferred to the Energy Reserve to maintain an acceptable level of funding in the reserve.

Funds moving into or out of the Energy Reserve will be approved per this policy. These funds can be used to finance (in whole or in part) energy projects, energy studies, pilot projects and other similar activities. For instance, incremental costs for more efficient options could be financed by the Energy Reserve with the understanding that it will be paid back through savings. Funding incremental costs for more high efficiency project options provides a win-win scenario as less capital would be requested and the lower operating costs will benefit operating budgets, plus move us closer to our energy intensity targets.

8.2 Verification and Validation of Utility Bills

The OEI will monitor utility bills (verify and validate) for the correct application of energy rates, demand and energy consumption charges. Funds recovered through this activity will be deposited into the Energy Reserve with the following rules to apply:

- Billing recovery from current budget year will be returned to client budget;
- Billing recovery from previous budget years will remain in the energy reserve.

8.3 Energy Projects - Lifecycle Costing

Energy Projects will be evaluated using Lifecycle Costing and Paybacks for the best ROI for the City. Designs and proposals shall include a base case option compared to more efficient options for staff to assess the long term operating costs in order to make the appropriate decisions based on capital and operating budget constraints.

8.4 Lighting Technology

Policy Action – Energy Efficient lighting Solutions

The City will endeavor to use the most energy efficient and latest proven lighting technology on lighting projects whether it is T8, T5 or new LED lighting as per The Green Energy Act 2009 And Ontario Regulation 404/12 Energy Efficiency – Appliances and Products. See the attached link in References section for additional information.

8.5 Incandescent Lighting

The City is committed to replacing or eliminating incandescent lighting in order to comply with Federal Standards National Resources Canada Proposed Amendment 12B (See Appendix 7 of NRC document) that would revise the minimum energy performance standards (MEPS) for general service incandescent lamps (light bulbs) on energy efficiency for light bulbs as outlined below.

8.6 Energy Management Standard – Central BAS Control

Policy Actions – Building Automation Systems

BAS activity and policy continue to evolve. The short term actions and related policy are outlined throughout Section 8.6.1 below.

The implementation of a Building Automation System (BAS) into existing facilities has been shown to reduce energy consumption in the order of 5%-20%, generating a return on investment in the range of 2-10 years. These systems provide flexibility for facilities to better regulate building temperatures, control indoor air quality, and allow for equipment schedules to be intricately tailored to the facilities requirements.

As BAS are modernized they will be centrally controlled such that they can be monitored and adjusted from a single location to maintain building temperatures and quickly identify and correct energy waste. This will ensure consistent temperature control is maintained and monitored from a single location and will also build on the existing system the City already has in place for other facilities.

The goals and objectives for the BAS moving forward through this policy are:

- Capital and maintenance cost reduction;
- Optimization of the existing BAS for energy consumption and comfort improvement;
- Continuous expansion of the BAS to other facilities selected and prioritized by the City based on the energy consumption and savings opportunities.

8.6.1 BAS Standardization

Moving toward the concept of an Internet-based open protocol Building Automation System (BAS) will ensure that the City of Hamilton will have the ability to obtain competitive pricing from a variety of vendors. Using approved prequalified vendors will provide the ability to have this

open system. The introduction of multiple vendors creates a need to develop a standard specification documenting the City's requirements. This specification will set a minimum standard of quality that all vendors must adhere to. Minimum standards for hardware and communication protocols will be defined, and City staff will work to refine and establish effective and efficient control strategies to optimize equipment performance without sacrificing occupant comfort or productivity.

In addition to the creation of a standard specification, the City will pre-qualify selected vendors that will provide the new BAS systems. This will also limit the amount of service contracts that the City will be required to enter into for on-going service.

8.7 Roof Capital Replacement Evaluation

As part of ongoing roof capital replacement evaluations that in addition to standard roof replacement that the feasibility of a "Green" or "White" roof be explored for City owned facilities that will be assessed using a life cycle costing analysis method.

8.8 Energy Efficient Equipment Purchasing

Policy Actions – Energy Efficient Equipment

Energy efficiency applies to many types of equipment and appliances that should be optimized according to the statements below.

Equipment standards are identified through both the Green Energy Act and a longer standing standard of performance called EnergyStar. Key elements from the Green Energy Act are outlined below. Further equipment standards exist; see the link for further details. For clarification, equipment should first meet the Green Energy Act guidelines, then EnergyStar rated equipment should be the next priority.

The City will use the Green Energy Act as a basis for minimum standards for energy efficiency and energy efficient products including the following:

- Household and commercial appliances
- Water heaters and other water heating equipment
- Furnaces and other space heating equipment
- Lamp and other lighting products
- Motors and transformers
- Electronic equipment
- Fenestration Products

ENERGY STAR® is trusted and a simple source that the City 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.

We are recommending ENERGY STAR in order to:

- reduce energy costs;
- reduce electricity demand;
- reduce impact on the environment;
- Energy-efficient products on the market today can reduce energy costs by 25 to 50 percent, or even more, without compromising quality or performance;
- Investments in energy-efficient products can quickly pay for themselves and provide a significant return, making funds available for investment in your community;
- Energy-efficient products have an extended life and offer decreased maintenance;
- Incentives may be available for some equipment.

ENERGY STAR is easy to use and provides comprehensive tools and information with an online purchasing guide for specifying products that meet energy efficiency criteria.

- City Purchasing Policies adapt as a minimum standard **ENERGY STAR®** rated equipment or equivalent for energy consuming devices such as appliances, photo copiers, computers, servers, computer monitors etc.
- All new and retrofit motors, heating equipment replacements (e.g. fans, pumps, water heaters, rooftop HVAC etc.) specify high efficiency motors as minimum standards. Where required the OEI will provide recommendations on minimum efficiency standards.

8.9 Energy Education and Awareness

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

8.9.1 Electricity Generation, Cogeneration, District Energy and Renewable Energy

Generation or cogeneration of electricity or developing district energy or renewable energy projects can be an attractive way of improving efficiency, providing security of supply and reducing environmental emissions. These projects keep revenue and jobs in our local economy.

Policy Actions – Generation, Cogeneration, District Energy and Renewable Energy

- 1) All electricity generation, cogeneration and district energy or renewable energy projects are evaluated on a case by case basis, with the aid of independent third party technical, legal and financial expertise, through the OEI.
- 2) The City will only construct clean or green generation, cogeneration, biomass or renewable energy projects.
- 3) These projects shall consider the economic impact to the City, including overall efficiency gains, security of supply, environmental impact, life cycle analysis and the local economic benefits for City.
- 4) The OEI is to be included in all generation, cogeneration, district energy, energy from waste and renewable energy project reviews well in advance of commitment to ensure all legal, technical and energy related issues have been considered and to allow for potential additional analysis.
- 5) The City of Hamilton shall implement strategies with HRPI (Hamilton Renewable Power Incorporated) to identify opportunities which exist in the generation of renewable energy. This includes initiatives which will reduce greenhouse gas emissions, maximize revenue generation for the City of Hamilton and provide a sustainable atmosphere for energy renewal initiatives. This includes accessing incentives, participation in the assessment of alternatives and the operation and management of installations, energy strategies or commitments (commodity supply contracts, hedge strategies etc).

8.10 Emergency Generators / Back-up Power Systems

Policy Actions - Emergency Generators / Back-up Power Systems

The following procedures will be followed for generators, and back-up power systems.

- All new and retrofit emergency generation / back-up power systems 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 vs. existing diesel powered units.
- All new and retrofit emergency generation / back-up power system projects are to evaluate the costs and feasibility of “synchronization” of this equipment with the facility so that these units can potentially be used for “Peak Shaving” or “Peak Clipping” when favorable market conditions exist. This would also enable the City to participate in Demand Response (DR) programs, Smart Grid, Energy Storage or other incentive programs offered by the OPA or others. Synchronization allows the emergency generators / back-up power system to run in parallel (at the same time) as the power is supplied to the facility from the grid and prevents power interruptions for critical and sensitive equipment such as elevators and computer systems.

- That the OEI be included in the review of all new or retrofit emergency generation /back-up power system projects well in advance of commitment to ensure all legal, technical and energy related issues have been considered and to allow for potential additional analysis.

8.11 Measurement and Verification

The purpose of Energy Project Measurement and Verification (M&V) is to verify energy savings resulting from activities that influence the energy consumption of a facility. This verified information will be used to track actual savings as mandated by the Green Energy Act and our progress towards our energy intensity targets.

Policy Action – Monitoring and Verification

Project M&V option (Basic or Enhanced) shall be driven by incentive program requirements or as directed by the OEI throughout this section.

Energy Project Measurement and Verification (M&V) activities are intended to cover:

- Energy Conservation Measures;
- Demand & Load Management Projects;
- Large Capital Projects;
- Renewable Energy Projects;
- City-wide corporate energy reduction goals.

The objective of Energy Project M&V is to:

- Facilitate the economic analysis of implementing energy saving measures by establishing a high confidence level in reported energy savings that are obtained through energy related projects;
- Establish a process to ensure that all significant project activities related to energy undergo an appropriate level of measurement and verification;
- Provide a method for improving accuracy of reported progress toward energy goals on a portfolio wide basis.

The M&V protocol that the OEI will adhere to was developed by City Staff. This protocol was designed around the International M&V protocol (IMVP) standard and was modified where appropriate to suit the needs of the City

Generally, energy project M&V activities can be grouped into two major categories: Basic and Enhanced. Basic is concerned with Utility Bill analysis. Enhanced covers engineering calculations (using stipulated values and measurements), metering and monitoring (spot, short term, or continuous measurements), and computer simulation models. The Save on Energy

web-site provides detailed guideline on Project Measurement and Verification Procedures. The following table presents a general guideline for project M&V required with typical measures.

Table 5: Monitoring and Verification Guidelines

Types	Description	M&V Required	
Replacement of major energy consuming equipment(s)	Replace older boiler or chiller with new unit.	Basic	Enhanced
Energy system upgrades	Improve existing system such as installing variable frequency drives on ventilation fans.	Basic	Enhanced
Building envelope upgrades	Upgrade windows and doors, replace caulking or cladding.	Basic	Enhanced
Lighting upgrades	Install more efficient lamps or ballasts.	Basic	Enhanced
Installation of control systems or sub-system	Install a building automation system (BAS) in a facility or portion of facility.	Basic	Enhanced
Improvements in efficiency of office equipment and use	Increase use of Energy Star Office equipment's, computers, printers, faxes to minimize unnecessary use.	Basic	
Operation and maintenance	Day to Day Operations	Basic	Enhanced
District Energy and its related projects	Process optimization. Equipment life cycle and efficiency replacement and other improvements to the system	Basic	Enhanced
HRPI & related projects	Process optimization. Equipment life cycle and efficiency replacement and other improvements to the system	Basic	Enhanced
Behavioral Changes	Occupants turn off lights and other equipment when not in use.	Basic	
Load shifting	Shifting equipment time of use to avoid peak demand charges.	Basic	

Motor Replacement	Installation of more energy efficient motors.	Basic	Enhanced
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M&V Responsibilities:

The following table lists guidelines for Energy Project M&V responsibilities:

Table 6: Monitoring and Verification Responsibilities

Entity	Responsibilities
City	Ensure that all energy related projects include Basic M&V.
City /Consultants	Review and approve an appropriate level of funding and effort on M & V depending on the value of a measure
Consultants	As a part of project implementation for projects under its scope of work:
Consultants	<ul style="list-style-type: none"> Obtain pricing and timelines for the M&V activities Create a project schedule to accommodate M&V time requirements Ensure M&V equipment commissioning occurs
City/Consultants	<ul style="list-style-type: none"> Maintain a listing/schedule of the known M&V activities
City	Review annually and recommend improvements to the M & V process and requirements.
	Generate and maintain a master project list of planned, approved, and implemented projects including verified project performance for completed projects.

M&V Standards and Guidelines:

The following are the applicable standards and sources of guidance for further details on the Measurement and Verification program:

- IPMVP Volume I: EVO 10000 – 1.2007, International Performance Measurement and Verification Protocol, Concepts and Options for Determining Energy and Water Savings, Volume 1, Efficiency Valuation Organization, April 2007.
- IPMVP Volume III (Part I and II): EVO 10000 – 1.2007, International Performance Measurement and Verification Protocol, Concepts and Options for Determining Energy Savings in New Construction, Volume III, Efficiency Valuation Organization, April 2007.

- ASHRAE Guideline 14-2002, Measurement of Energy and Demand Savings, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc, 2002.
- ASHRAE Guideline 22-2008, Instrumentation for Monitoring Central Chilled-Water Plant Efficiency, ASHRAE, 2008.

8.12 Building Labeling

Policy Actions – Building Labelling

The City will adopt a building energy ranking system for appropriately sized corporate buildings. OEI will assess buildings and assign the building rankings. This tool will act as a benchmark comparing similar buildings and similar end uses on an energy intensity basis. This will also assist with building education and awareness. Building labelling will also assist in targeting the opportunities for improvement and acknowledging high performing areas.

9.0 SPECIFIC POLICIES - ENERGY PROCUREMENT

Policy Actions – Energy Procurement

The following areas will be managed by the OEI as indicated throughout Section 9.

9.1 Demand Response

The OEI will promote the utilization of City owned assets that are capable of contributing to a reduction in electrical demand in order for the City to participate in available demand response programs. To facilitate the process, by way of this Corporate Energy policy and as stated in the Energy Commodity Policy, the OEI will be granted authorization to enter into such agreements on behalf of the City of Hamilton.

9.2 Transportation Fuels

The OEI will assume the role of procuring and managing the City's transportation fuel requirements for all City of Hamilton users. Users include Fleet, Transit, Police, Fire and EMS. Traditional fuels that are petroleum based (diesel and gasoline) will be and continue to be managed by the OEI, as will any future transportation type fuels such as Compressed Natural Gas (CNG) or Liquefied Natural Gas (LNG). These fuels will be procured according to the direction and guidelines set out in the existing Energy Commodity policy.

9.3 Utility Supply and Rate Management

The OEI will evaluate utility rates (electricity, natural gas, water and waste water) for the City on an ongoing basis taking into account evolving energy requirements, energy market regulations and supply conditions/ contacts and the City's commodity supply arrangements. The OEI may initiate all utility rate changes as required to manage utility supply and utility rates. This is to ensure continued supply and allow for optimization of utility metering and rates favourable to the City.

9.4 Energy Contract Management

The OEI will manage all energy commodity, energy supply, utility rates etc., as required to maintain energy supply to the City and the City's end-use customers where the City directly supplies district energy (e.g. heating, cooling or electricity). All contracts will be managed within established City guidelines.

9.5 Utility Billing, Metering and Sub-Metering

The OEI will manage all City customer billing data, metering, sub-metering, monitoring, verification, validation and energy use data for the City's district heating, cooling, natural gas and electricity end-use customers.

9.6 Renewable Energy

The City of Hamilton is one of the Provinces leading municipal producers of Clean and Green Power. Currently the majority of the Central Utility Plant's electricity which is supplied by Hamilton Community Energy is EcoLogo Certified as Clean Energy.

The OEI will continue to manage existing and future operations of renewable energy sites. Existing sites include Hamilton Renewable Power Inc. (HRPI) Cogeneration plants located at 900 Woodward Ave. and the Glanbrook land fill. Furthermore, a new City owned biogas purification unit located at 900 Woodward Ave. processes raw methane from the waste water process purifies it and injects the final renewable natural gas into the Union gas distribution system. Additional renewable energy opportunities will be pursued through HRPI or the City as opportunities arise.

9.6.1 Inclusion of OEI in Renewable Energy Project Evaluations

That the OEI be included in all corporate renewable energy project evaluations prior to commitment to ensure all legal, technical and energy related issues have been considered.

9.7 Green Power

With the current local production of clean and green power, an abundance of green energy production (wind, hydraulic and growing solar) already present in the Ontario generation mix and the premium cost of buying green power, the OEI recommends that the City delay purchasing any new Green Power at this time. It is recommended that Green Power be considered as part of the LEED evaluation for major retrofits or new construction (50% Green Power for a facilities provides one LEED credit). Energy supplied by the Central Utilities Plant or Hamilton Community Energy is certified green EcoLogo power. Other sources and other sites for Green Power can be re-evaluated at a later date if necessary to supplement target shortfalls in CDM initiatives.

9.8 Emissions Trading

Emission Trading/Carbon Trading/Cap and Trade is a market-based system for reducing greenhouse gas emissions where government sets limits on the amounts of greenhouse gas (GHG) emitted through allowances. Over time, emissions limits are reduced by reducing overall limits. Surplus allowances can be sold to those not meeting their allowances. The Ontario Government has recognized emissions trading as a cost-effective approach to reducing GHG emissions that provides flexibility for businesses to develop their own compliance strategies while ensuring that, overall, emissions decrease. Ontario is currently working with other provinces (British Columbia, Manitoba, and Quebec) and the US (California) through the Western Climate Initiative to design a broad based regional emissions trading system. Ontario's program currently focuses on the industrial sector but inevitably will capture other sectors in the future.

The primary issue that the City will need to consider under a trading scheme is whether the City sells or retires future credits for the benefit of the environment (e.g. sell off any environmental

attributes - credits or allowances) obtained through an off-set program. It is recommended that the OEI and Corporate Finance continue to work together to establish a framework for selling or retiring future emission credits, carbon trading, green tags etc. along with the required certification and cost of ongoing monitoring and verification of these measures.

Note: If a renewable energy project receives incentive funding from the OPA (Ontario Power Authority), their contract stipulates that all green tags or carbon credits produced, become the property of the OPA. The OPA in turn would have the right to sell these credits to a third party.

10.0 ENERGY COMMODITY POLICY

Policy Actions – Energy Commodity Policy

The following Section in its entirety outlines the policy for commodity purchasing.

10.1 PART I - POLICY STATEMENT AND INTERPRETATION

1. Purpose of Statement

In recognition of the unique position of Energy Commodities (as herein defined) energy prices are set by varying market conditions (i.e. supply and demand), fluctuating hourly, daily and seasonally. Supply challenges for these commodities and varying supply and demand have contributed to price volatility and have produced forward market price and budgetary uncertainty.

Buyers in the Ontario marketplace who wish to control commodity price risk must enter into commodity price hedging agreements, which are intended to reduce the risk of adverse price movements in a commodity. This Statement of Policies and Goals provides the framework for the purchase, sale, delivery, and storage of Energy Commodities and the consideration of price hedging by the City of Hamilton for all Energy Commodities.

2. Definitions

“City Affiliates” are those entities with which the City is not at arm’s length within the meaning of the *Income Tax Act (Canada)*.

“Contract Agent” means an external agent, contractor, consultant, or other representative hired by the City to assist with the procurement, sale, and/or delivery of Energy Commodity for the City.

“Cooperative Energy Purchasing” means coordination of City Energy Commodity purchases with Energy Commodity purchases of City Affiliates, or other organizations.

“Energy Commodities” means electricity, green power, natural gas, methane and all other petroleum based fuel products such as: diesel, bio-diesel, gasoline, fuel oil, propane and any other bulk commodity primarily used by the City for the purpose of heating and cooling of buildings and other structures, electricity generation, cogeneration, demand response programs, smart grid programs and the fuelling of City fleets, as determined by the Manager of Energy Initiatives.

“Green Energy” means energy generated from renewable energy sources, such as certified water power, solar, biogas, biomass and wind. Other terms for Green Energy include: Green power certificates, Renewable Natural Gas, Carbon Offsets, Tradable Renewable Certificates or “Green Tags”. These attributes, embodied in a certificate or through other certification, may be bought and sold either bundled or unbundled with the commodity.

3. Policy Statement

The City of Hamilton (“City”) will procure the necessary quality and quantity of Energy Commodities in an efficient, timely, and cost effective manner, while maintaining the controls necessary for a public institution in accordance with this Energy Commodity Policy. The City will encourage the negotiation of fair Master Agreements, and agreements with Contract Agents, with respect to the purchase, sale, delivery, and storage of Energy Commodities. The City will strive to ensure that the best value is obtained and that the financial stability of Energy Commodity suppliers meets high thresholds to ensure sustainability and reliability of supply. The City will consider commodity price hedging agreements as a means of fixing, directly or indirectly, or enabling the City to fix the price or range of prices to be paid by the City for the future delivery of some or all of a specific Energy Commodity, or the future cost to the municipality of an equivalent quantity of the Energy Commodity, where is advantageous for the City to do so.

The City will also consider opportunities for entering into agreements with utilities and other transportation and delivery supplier contracts (i.e. pipeline supply) to secure commodity supply and utility rates of specific Energy Commodities.

PART II - DESIGNATION AND DELEGATION OF RESPONSIBILITIES

1. Designated Authority - General Manager of Finance and Corporate Services

The General Manager of Finance and Corporate Services (“GMFCS”) for the City of Hamilton is the designated person responsible for administrative matters pertaining to the purchase, sale, delivery, and storage of Energy Commodities, including, without limitation, determination of potential suppliers and the entering into of Master Agreements and related transactions, as well as Energy Commodity price hedging in an efficient and cost-effective manner. The GMFCS will delegate certain administrative duties and responsibilities to internal staff, particularly the Manager of Energy Initiatives, and external Contract Agents.

The General Manager of Finance and Corporate Services, or his/her authorized delegate, is authorized to enter into contracts for the purpose of engaging a Contract Agent with respect to the purchase, sale and/or delivery of Energy Commodities in accordance with Part III of this Energy Commodity Policy.

The General Manager of Finance and Corporate Services is responsible for:

- a) determining what supplier(s) are appropriate for the City to engage in negotiations in order to secure Master Agreements with respect to the purchase, sale, delivery and/or storage of Energy Commodities in accordance with this Energy Commodity Policy;
- b) determining when it would be advantageous for the City to engage Contract Agents in order to assist the City with respect to its Energy Commodity procurement strategy and determining which Contract Agents to engage in negotiations and/or to enter into agency or other agreements with, in accordance with this Energy Commodity Policy;

- c) determining when it would be advantageous for the City, to participate in Cooperative Energy Purchasing and to coordinate such joint efforts in accordance with this Energy Commodity Policy; and
- d) determining whether a particular Energy Commodity price hedging agreement is advantageous for the City based on the considerations outlined in this Energy Commodity Policy.

2. Authorized Delegate - Manager of Energy Initiatives

The Manager of Energy Initiatives will be the General Manager of Finance and Corporate Services' authorized delegate to conduct the following:

- a) seek out, with or without the use of Contract Agents, potential suppliers of Energy Commodities and engage in negotiations with same with respect to the purchase, sale, delivery and/or storage of Energy Commodities using the criteria for potential suppliers outlined in this Energy Commodity Policy, including the entering into of Master Agreements (with terms and conditions acceptable to the City Solicitor);
- b) execute Energy Commodity procurement, sale, delivery, and/or storage contracts and enter into Energy Commodity transactions in accordance with this Energy Commodity Policy and on terms and conditions acceptable to the City Solicitor;
- c) enter into agency agreements and/or other contracts and/or arrangements with Contract Agents and/or electric or natural gas distribution and transmission utilities or other Energy Commodity agencies and/or companies for the purpose of purchase, sale, delivery and/or storage of Energy Commodities and incentives upon approval from the General Manager of Finance and Corporate Services and on terms and conditions acceptable to the City Solicitor;
- d) enter into agreements with respect to the purchase, sale, delivery, and/or storage of Energy Commodities with City Affiliates on terms acceptable to the General Manager of Finance and Corporate Services;
- e) enter into district energy agreements (with terms and conditions acceptable to the City Solicitor) with third parties, including, but not limited to, school boards, Provincial agencies and other private or public institutions for electricity supply, heating or cooling (thermal energy);
- f) meet with the General Manager of Finance and Corporate Services, as required, and provide written reports regarding the past performance of Energy Commodity hedging agreements, future strategies and other issues as requested, as well as information with respect to the use of Contract Agents;
- g) notify the General Manager of Finance and Corporate Services, in writing, of any significant changes in the Energy Commodity hedging philosophies or policies and organization; and
- h) provide periodically, not less than annually, lists of Energy Commodity hedging agreements and agreements with Contract Agents and such other information as may be requested by the General Manager of Finance and Corporate Services.

3. Use of Contract Agents

The Contract Agent will only be authorized to act within the scope of the specific authority under any executed contract with the City and shall, in accordance with such contract, provide a number of services to the City, which may include:

- a) assisting the Manager of Energy Initiatives in developing a prudent energy procurement mix and specific procurement objectives and strategies;
- b) monitoring, analyzing and reporting on the City's procurement performance and supporting the Manager of Energy Initiatives with respect to Energy Commodity procurement, delivery and storage related matters;
- c) assisting in the selection of Energy Commodity suppliers, delivery, and/or storage agents;
- d) meeting with the Manager of Energy Initiatives, as required;
- e) enter into contracts and/or arrangements (with terms and conditions acceptable to the City Solicitor) with electric or natural gas distribution or transmission utilities or other Energy Commodity agencies and/or companies for the purpose of purchase, sale, delivery and/or storage of Energy Commodities upon approval from the Manager of Energy Initiatives; and
- f) enter into district energy agreements (with terms and conditions acceptable to the City Solicitor) with third parties, including, but not limited to, school boards, Provincial agencies, and other private or public institutions for electricity supply, heating or cooling (thermal energy) upon approval from the Manager of Energy Initiatives.

PART III - PROCUREMENT POLICIES

1. Energy Commodity Suppliers, Delivery, and/or Storage Entities

In determining what suppliers, delivery and/or storage entities are appropriate for the City to engage in negotiations in order to secure Master Agreements with respect to the purchase, sale, delivery, and/or storage of Energy Commodities, the following nonexclusive considerations **will** be taken into account:

- i. past, present and projected pricing strategies;
- ii. acceptability of contract terms and conditions by the City Solicitor;
- iii. the past, present and prospective financial stability of any potential supplier, including the meeting of a minimum threshold of financial stability set in accordance with this Energy Commodity Policy;
- iv. any conflicts of interest as between the City, City Affiliates and any supplier, delivery and/or storage entity;

- v. in the opinion of the General Manager of Finance and Corporate Services, the commercial relationship between the City and/or City Affiliates and the supplier, delivery and/or storage entity has been impaired by the prior and/or current act(s) or omission(s) of such supplier or entity including but not limited to:
- (a) a corporation, including an officer, director or shareholder of a corporation, or other person which has been involved in litigation with the City;
 - (b) any corporation that is an affiliate of or successor to, or has one or more of its officers, directors or shareholders, any person or corporation described in clause (a);
 - (c) the failure of the supplier, delivery and/or storage entity to pay, in full, all outstanding payments (and, where applicable, interest and costs) owing to the City by such supplier or entity, after the City has made demand for payment of same;
 - (d) the refusal to follow reasonable directions of the City or to cure a default under any contract with the City as and when required by the City;
 - (e) the supplier, delivery and/or storage entity refusing to enter into a contract with the City after the supplier's (or entity's) bid, proposal or other document provided in response to a City procurement document has been accepted by the City;
 - (f) the supplier, delivery and/or storage entity refusing to perform or to complete performance of a contract with the City;
 - (g) act(s) or omission(s) resulting in a claim by the City under a bid bond, a performance bond, a warranty bond or any other security required to be submitted by a vendor on a RFP, RFQ, RFRC, or Tender;

within the five year period immediately preceding the date on which the supplier, delivery or storage entity enters into a contract with respect to Energy Commodities with the City;

(v.1) for the purposes of subsection (V), the prior acts or omissions of a supplier, delivery or storage entity shall also include the prior acts or omissions of: an officer, a director, a majority or controlling shareholder, or a member of the supplier (or entity) if a corporation; a partner of the supplier (or entity), if a partnership; any corporation to which the supplier (or entity) is an affiliate of or successor to, or an officer, a director or a majority or controlling shareholder of such corporation; and any person with whom that the supplier (or entity) is not at arm's length within the meaning of the *Income Tax Act (Canada)*;

(vi) in the opinion of the General Manager of Finance and Corporate Services there are reasonable grounds to believe that it would not be in the best interests of the City to enter into a contract with the supplier, delivery or storage entity, including (without limiting the generality of the foregoing):

- (a) the conviction of that supplier, delivery and/or storage entity or any person or entity with whom that supplier, delivery and/or storage entity is not at arm's length within the meaning of the *Income Tax Act (Canada)* of an offence under any taxation statute in Canada;

- (b) the conviction or finding of liability of that supplier, delivery and/or storage entity under the *Criminal Code* or other legislation or law, whether in Canada or elsewhere and whether of a civil, quasi-criminal or criminal nature, of moral turpitude including but not limited to fraud, theft, extortion, threatening, influence peddling and fraudulent misrepresentation;
- (c) the conviction or finding of liability of the supplier, delivery and/or storage entity under any environmental legislation, whether of Canada or elsewhere, where the circumstances of that conviction evidence a gross disregard on the part of that entity for the environmental well-being of the communities in which it carries on business;
- (d) the conviction or finding of liability of the supplier, delivery and/or storage entity relating to product liability or occupational health or safety, whether of Canada or elsewhere, where the circumstances of that conviction evidence a gross disregard on the part of that entity for the health and safety of its workers or customers;
- (e) the conviction or finding of liability of that supplier, delivery and/or storage entity under the financial securities legislation whether of Canada or elsewhere, where the circumstances of that conviction have, or would have, significant negative financial impact on any contract with the City.

2. Use of Energy Commodity Price Hedging Strategies/Agreements

In determining whether a particular Energy Commodity price hedging agreement is advantageous for the City, the following non-exclusive considerations **will** be taken into account:

- (i) any and all Energy Commodity purchases for which commodity price hedging agreements will be appropriate;
- (ii) that the financial position of the City will be enhanced in all likelihood by virtue of the use of such an agreement;
- (iii) that the all-inclusive contracted price and cost to the City of the associated Energy Commodity will be lower or more stable than it would be without the agreement;
- (iv) the formulation of a detailed estimate of the expected result of using such an agreement;
- (v) the formulation of the financial and other risks to the municipality that would exist with the use of such an agreement and determine if such risk would be lower than the financial and other risks to the municipality that would exist without such an agreement;
- (vi) using his/her best judgment and in his/her sole discretion determine that the agreement contains adequate risk control measures, for example:
 - 1. ensuring that if either party's credit rating falls below BBB – (S&P); Baa3 (Moody's); and/or BBB (low) (DBRS), the other party may demand Adequate

Assurance of Performance. "Adequate Assurance of Performance" shall mean sufficient security in the form, amount and for the term reasonably acceptable to the City, and/or, but not limited to being able to provide an unconditional irrevocable letter of credit or prepayment;

2. providing, in the case where a supplier has no credit rating, a guarantee from the parent corporation (assuming parent corporation meets credit rating requirements in 1 above);
3. limiting credit exposure based on a degree of regulatory oversight and/or on the regulatory capital of the other party to the agreement; and

(vii) ensure ongoing monitoring with respect to the Energy Commodity price hedging agreements.

3. Contract Agents (consultants)

The Manager of Energy Initiatives **shall** seek Council approval for a specified period of time before engaging any Contract Agents for the purposes of this Energy Commodity Policy.

4. Cooperative Energy Purchasing

The Manager of Energy Initiatives **shall** consider engaging in Cooperative Energy Purchasing when, in his/her opinion, it would be advantageous to the City to do so based on the following non-inclusive considerations:

- (i) the possibility of economies of scale (i.e. better buying power);
- (ii) opportunities for cost-sharing of services; and
- (iii) opportunities for securing indirect financial benefits to the City.

The Manager of Energy Initiatives shall have the authority to enter into Cooperative Energy Purchasing initiatives with City Affiliates at his discretion in consultation with the General Manager of Finance and Corporate Services and the City Solicitor.

All other Cooperative Energy Purchasing initiatives shall be subject to prior Council approval.

PART IV - REPORTING REQUIREMENTS

The General Manager, Finance and Corporate Services and Treasurer, shall report to Council at least once each fiscal year with respect to any and all Energy Commodity price hedging agreements, and other Energy Commodity agreements, in place. The report shall contain, at a minimum, all requirements as set out in O. Reg. 653/05 (as it exists from time to time) and shall include:

1. A statement about the status of the Energy Commodity price hedging agreements during the period of the report, including a comparison of the expected and actual results of using the agreements;

2. A statement by the Treasurer indicating whether, in his or her opinion, all of the agreements entered during the period of the report are consistent with this Energy Commodity Policy relating to the use of financial agreements to address commodity pricing and costs;
3. An overview of any agreements with Contract Agents (including, without limitation, actual costs, services provided and frequency of use) and a statement by the Treasurer indicating whether, in his or her opinion, all of these agreements are consistent with this Energy Commodity Policy with respect to the use of Contract Agents;
4. An overview of any Cooperative Energy Purchasing initiatives and/or agreements and a statement by the Treasurer indicating whether, in his or her opinion, all of these agreements are consistent with this Energy Commodity Policy with respect to the use of Cooperative Energy Purchasing;
5. Such other information as Council may require; and
6. Such other information as the Treasurer considers appropriate to include in the report.

PART V - ROLE OF CITY COUNCIL

Council is responsible for determining, based on information provided by City staff, whether the financial implications of Energy Commodity price hedging agreements are favourable relative to alternatives, and whether the risks associated with the Energy Commodity price hedging agreements are reasonable.

In considering the report and recommendation from the General Manager, Finance and Corporate Services and Treasurer, Council is responsible for ensuring that legal and financial advice has been obtained and must consider whether the scope of the proposed Energy Commodity price hedging agreements warrants further legal or financial advice from an independent source.

Excerpt from *Municipal Act, 2001*, Ontario Regulation 653/05**Debt-Related Financial Instruments and Financial Agreements****COMMODITY PRICE HEDGING AGREEMENTS**

5. (1) A municipality that has entered, or plans to enter, an agreement under Part II of the Act for the supply of a commodity required for a municipal system may enter into one or more financial agreements to minimize the cost or financial risk associated with incurring debt for the commodity. O. Reg. 653/05, s. 5 (1).

(2) The financial agreement must fix, directly or indirectly, or enable the municipality to fix the price or range of prices to be paid by the municipality for the future delivery of some or all of the commodity or the future cost to the municipality of an equivalent quantity of the commodity. O. Reg. 653/05, s. 5 (2).

(3) Subject to subsection (4), the municipality shall not sell or otherwise dispose of the financial agreement or any interest of the municipality in the agreement. O. Reg. 653/05, s. 5 (3).

(4) The municipality may sell or otherwise dispose of a financial agreement or an interest of the municipality in the agreement if, in the opinion of the treasurer of the municipality, the sale or disposition is in the best interests of the municipality and if either of the following conditions is satisfied:

(1.) The sale or disposition is part of a transaction for the sale of real property by the municipality relating to a change in the use of the property by the municipality.

(2.) The municipality has ceased to carry on any activity relating to the municipal system for which the commodity was being acquired. O. Reg. 653/05, s. 5 (4).

Statement of policies and goals re commodity price hedging agreements

6.(1) Before a municipality passes a by-law authorizing a commodity price hedging agreement, the council of the municipality shall adopt a statement of policies and goals relating to the use of financial agreements to address commodity pricing and costs. O. Reg. 653/05, s. 6 (1).

(2) The council of the municipality shall consider the following matters when preparing the statement of policies and goals:

1. The types of projects for which commodity price hedging agreements are appropriate.
2. The fixed costs and estimated costs to the municipality resulting from the use of such agreements.
3. Whether the future price or cost to the municipality of the applicable commodities will be lower or more stable than they would be without the agreements.
4. A detailed estimate of the expected results of using such agreements.

5. The financial and other risks to the municipality that would exist with, and without, the use of such agreements.
6. Risk control measures relating to such agreements, such as,
 - i. credit exposure limits based on credit ratings and on the degree of regulatory oversight and the regulatory capital of the other party to the agreement,
 - ii. standard agreements, and
 - iii. Ongoing monitoring with respect to the agreements. O. Reg. 653/05, s. 6 (2)

Report on commodity price hedging agreements

7. (1) If a municipality has any subsisting commodity price hedging agreements in a fiscal year, the treasurer of the municipality shall prepare and present to the municipal council once in that fiscal year, or more frequently if the council so desires, a detailed report on all of those agreements. O. Reg. 653/05, s. 7 (1).
- (2) The report must contain the following information and documents:
 1. A statement about the status of the agreements during the period of the report, including a comparison of the expected and actual results of using the agreements.
 2. A statement by the treasurer indicating whether, in his or her opinion, all of the agreements entered during the period of the report are consistent with the municipality's statement of policies and goals relating to the use of financial agreements to address commodity pricing and costs.
 3. Such other information as the council may require.
 4. Such other information as the treasurer considers appropriate to include in the report. O. Reg. 653/05, s. 7 (2).

11.0 DEFINITIONS

“**ASHRAE**” means American Society of Heating, Refrigeration and Air Conditioning Engineers.

“**CUP**” (**Central Utility Plant**) is located within the downtown core of Hamilton and was constructed and became operational in 1977, in order to generate and distribute district energy to facilities in the downtown core. Electricity, chilled water and hot water are distributed to end use customers. Sites connected to the CUP for all or some of these services include Copp’s Coliseum, the Central Library, and Farmer’s Market, Hamilton Place, Convention Centre, Parking Garage, Ellen Fairclough Building, Art Gallery, McMaster (old school board site) and Hamilton City Hall.

“**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 City’s building stock. We can also account for building expansions, changes in the City’s 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 **City owned** buildings and grounds e.g. parks and recreation facilities.

“**GJ**” means giga-joule

“**HECFI**” means The Hamilton Entertainment and Convention Facilities, Inc.

“**HVAC**” means heating, ventilation, and air-conditioning.

“**IESO**” means Independent Electricity System Operator.

“**kWh**” means kilowatt hour

“**kW**” means kilowatt

“**L**” means litres

“**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, OM&R 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)

“m3” means cubic metres

“OEB” means Ontario Energy Board

“OEI” means Office of Energy Initiatives

“OPA” means Ontario Power Authority

“Operations” Operations is what the City "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.

“Zero Carbon” means that all industrial sources of CO₂ have been converted to run on zero carbon emitting energy sources and that no more carbon emissions are being added to the atmosphere from any additional source to the natural carbon balance of the planet that existed before industrialization.

12.0 REFERENCES

EMISSIONS TRADING:

MOE – Climate Change – Participation in Emissions Trading

http://www.ene.gov.on.ca/environment/en/category/climate_change/STDPROD_078899.html

MOE Discussion Paper – GHG Emissions Reductions

http://www.downloads.ene.gov.on.ca/envision/env_reg/er/documents/2013/011-7940.pdf

GHG Protocol

<http://www.ghgprotocol.org/standards/corporate-standard>

GREEN ENERGY ACT:

Green Energy Act – Energy Conservation and Demand Management Plans

https://www.e-laws.gov.on.ca/html/source/regs/english/2011/elaws_src_regs_r11397_e.htm

Green Energy Act – Energy Efficiency – Appliances and Products

http://www.e-laws.gov.on.ca/html/source/regs/english/2012/elaws_src_regs_r12404_e.htm

Green Energy and Green Economy Act

http://www.e-laws.gov.on.ca/html/source/statutes/english/2009/elaws_src_s09012_e.htm

Ontario Ministry of Energy – Green Energy Act

<http://www.energy.gov.on.ca/en/green-energy-act/>

REPORTS:

Achieving Balance - Ontario's Long Term Energy Plan

<http://www.energy.gov.on.ca/en/ltep/>

Restoring Balance – The First Three Years of the Green Energy Act

http://www.eco.on.ca/uploads/Reports-Energy-Conservation/2012/Energy_Conservation_Spring_2011.pdf

Technical Guide to Renewable Energy Approvals

http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@resources/documents/resource/stdprod_088422.pdf

IPCC – Climate Change 2013 – The Physical Science Basis

<https://www.ipcc.ch/report/ar5/wg1/>

ICLEI – Local Governments for Sustainability

<http://www.icleicanada.org/>

Carbon Disclosure Project – includes link to Wealthier, Healthier Cities

<https://www.cdp.net/en-US/Programmes/Pages/cdp-cities.aspx>

INCENTIVES:

OPA SaveOnEnergy programs

<https://saveonenergy.ca/Business/Program-Overviews.aspx>

STANDARDS:

Energy Efficiency Equipment Purchasing: <http://www.canlii.org/en/on/laws/regu/o-reg-404-12/latest/o-reg-404-12.html>

Regulations Amending the Energy Efficiency Regulations: <http://canadagazette.gc.ca/rp-pr/p1/2013/2013-10-05/pdf/g1-14740.pdf>

CAFE Standards and Regulations – EPA

<http://www.epa.gov/fueleconomy/regulations.htm>

NRCan National Building Code Canada

<http://www.nationalcodes.nrc.gc.ca/eng/nbc/>

EVO – Measurement & Verification Standards

<http://www.evo-world.org/index.php?lang=en>

BOMA Best – Standard for Certification

<http://www.bomabest.com/>

LEED Certification

<http://www.usgbc.org/leed/certification>

ORGANIZATIONS/ASSOCIATIONS:**AMO – Energy Policy**

<https://www.amo.on.ca/Advocacy.aspx?searchtext=&searchmode=exactphrase&date=0;&issue=7;&category=0;>

Energy Star (US site)

<https://www.energystar.gov/>

NRCan – Energy Star in Canada

<http://www.nrcan.gc.ca/energy/products/energystar/12519>

NRCan – Energy Efficiency

<http://www.nrcan.gc.ca/energy/efficiency>

BOMA Canada <http://www.bomacanada.ca/>**Carbon Disclosure Project – includes link to Wealthier, Healthier Cities**

<https://www.cdp.net/en-US/Programmes/Pages/cdp-cities.aspx>

Regulated/Energy Boards**NEB**

<http://www.neb-one.gc.ca/clf-nsi/index.html>

Energy reports

<https://www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/nrgyrprt/nrgyrprt-eng.html>

OEB

<http://www.ontarioenergyboard.ca/OEB/Consumers>

OPA - Conservation: <http://www.powerauthority.on.ca/opa-conservation>

Generation contracts: <http://www.powerauthority.on.ca/generation>

Power System Planning: <http://www.powerauthority.on.ca/power-planning>

Source : <http://www.canlii.org/en/on/laws/regu/o-reg-404-12/latest/o-reg-404-12.html>

Local Utilities

- Horizon Utilities Inc. <https://www.horizonutilities.com/pages/default.aspx>

- Union Gas Limited <http://www.uniongas.com/>

Pipelines

TCPL - <http://www.transcanada.com/index.html>

Alliance - <http://www.alliancepipeline.com/Pages/default.aspx>

Vector - <http://www.vector-pipeline.com/vector/default.aspx>

Pricing and Market information

AECO (Niska owned) storage & pricing HUB

<http://www.niskapartners.com/our-business/natural-gas-storage/aeco-hub/>

IESO demand & market prices

http://www.ieso.ca/imoweb/siteShared/demand_price.asp?sid=bi

Global Adjustment http://www.ieso.ca/imoweb/siteShared/electricity_bill.asp?sid=bi

Average HOEP http://www.ieso.ca/imoweb/siteShared/monthly_prices.asp?sid=bi

EAI US Energy Information Agency (NG & Storage & Fuel)

<http://www.eia.gov/>

Gas/Oil Trading References

Bloomberg: <http://www.bloomberg.com/energy/>

CME: <http://www.cmegroup.com/trading/energy/>

INO: <http://quotes.ino.com/exchanges/category.html?c=energy>