

Corporate Energy and Sustainability Policy

CITY OF HAMILTON

ENERGY, FLEET AND FACILITIES MANAGEMENT DIVISION
PUBLIC WORKS DEPARTMENT

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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 calls for a review every five (5) years. Regular review of the policy is beneficial to further define its goals, targets and policy actions as regulatory framework, technologies and energy industries evolve.

The latest City of Hamilton's Corporate Energy and Sustainability Policy (CESP) will be maintaining its current corporate energy intensity reduction targets of 45% in 2030 and 60% in 2050 as compared to a 2005 base year. The original target of 20% reduction by 2020 was met, and the current energy intensity reduction is 25% less than the base year. Meeting these targets will also put Hamilton on track to become a net zero carbon municipality.

The purpose of the CESP 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.

In 2008, the City created and approved the City's first corporate Energy Commodity Policy (PW08144/FCS08114). 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. The energy Commodity Policy was integrated into the Corporate Energy Policy in 2014 to form one cohesive policy document for ease of reference and continues with this iteration of the Corporate Energy and Sustainability Policy herein.

The CESP is also integral to the success of meeting the revised environmental emission targets established through the climate change task force. The previous target for 50% greenhouse gas emissions remains, a new target of net zero emissions by 2050 has been put in place. 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 Intensity Reduction Targets	Emissions Reduction and Offset Target
2030	45%	50%
2050	60%	100% (Net 0)*

* Revised target, previously 80% reduction by 2050.

The focus of this policy continues to be on corporate energy and sustainability activities, dealing with City owned assets.

The City of Hamilton's CESP is designed to:

- Facilitate the achievement of City-wide energy and emission reduction targets;
- Address legislated reporting requirements;
- 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 CESP incorporates the following key focus areas:

1. Mitigation of Energy and Fuel Consumption

- Reduction of energy and fuel use to facilitate achievement of specified targets

2. Specific Energy and Sustainability Policies and Policy Actions

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

3. Energy Commodity Policy

- All Energy specific purchasing policy related to the: commodities, sales, delivery (rates) and storage of energy commodities including hedging agreements. Detailed in section 7.0.

4. Legislated Programs and Reporting Requirements

- The Public Works, Energy Initiatives section 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, sustainability and demand management on an annual basis at a minimum as required by the current provincial legislation.

- At least once every year, energy consumption, energy intensity, GHG emissions and energy costs will be reported to City council describing the performance of the City's energy program.
- Additionally, Public agencies are required to report annually to the province and publish on the provincial website and intranet site and make available to the public in printed forms at its head office, the public agency's Energy Consumption and Greenhouse Gas Emission Template as required by current legislative requirements.
- As required by current provincial legislation, Public agencies are required to submit to the Minister, publish on its website and intranet site and make available to the public in printed forms at its head office, the public agency's five year conservation and demand management plan to outline the actions to reduce and optimize energy use and reduce environmental emissions and throughout all City departments.

5. 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.

6. Alignment with Community Energy Plan

- City of Hamilton is encouraged to actively participate towards the stated reporting, targets and goals of the community-based plan once that plan is endorsed by Council.

The City has maintained a commitment to managing the energy portfolio within the ever-evolving energy and regulatory environment, incorporating energy related policies and energy efficiency into project and operational decision-making and setting targets to achieve reductions in energy intensity and GHG emissions. The specific focus areas of the policy are further defined in the sections to follow.

1.0 MITIGATION OF ENERGY CONSUMPTION

Building on the success of the CESP to date (25% energy intensity reduction as of 2019); it is necessary that the City continue to move forward with its energy and sustainability strategy.

The City will need to achieve its targets through a combination of:

1. Corporate Energy and Sustainability Committees;

2. Annual reporting on energy use, energy intensity, emissions and energy management plan;
3. Building Environmental Standards;
4. Monitoring and Targeting of Existing/New/Retrofitted Buildings;
5. Investment in Energy Efficiency - Existing Buildings;
6. Implementation of Energy Efficient Design - Major Renovations / New Construction;
7. Implementation of Energy Management Policies related to Renewable Energy, Environmental Impact;
8. Optimization of energy use by Hamilton Water;
9. Prudent management of energy commodity purchasing.

1.1 Corporate Energy and Sustainability Committee (CESC)

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.

Policy Actions – CESC

- Each committee shall consist of key representatives from within the divisions including Directors, Managers and other members of the management section as well as project managers and advisors e.g. Energy Initiatives section.
- Each CESC will oversee the development of respective Energy Conservation and Development Plans for achieving targeted results.
- Each CESC will monitor energy intensity, energy usage, GHG emissions, where applicable to address areas of concern, promote best practices and develop measures for energy efficiency improvements and GHG emissions reductions.

1.2 Annual Reporting

At least once every year energy intensity, energy consumption, emissions and energy costs will be reported to City council describing performance of the City's energy program for City-owned assets using various key performance indicators (KPIs). KPIs assist in tracking progress and identifying areas of concern or focus for energy and emissions reductions. These reports are to be posted on the City web site.

In addition, reporting of corporate energy use, emissions or other energy-related items, including Conservation and Demand Management (CDM) plans are required to be submitted to provincial and/or federal regulatory bodies. CDM plans are currently required by the province to be reviewed, evaluated and updated every five years.

Policy Actions – Corporate Annual Reporting

- The Public Works, Energy Initiatives section will be responsible for reporting on all of Hamilton corporate energy intensity, energy consumption, emissions, costs, consumption reductions, cost savings initiatives, conservation and demand management on an annual basis.
- The Public Works, Energy Initiatives section will be responsible for reporting on all of Hamilton corporate energy consumption, associated emissions, energy conservation and demand management plans when and as required by provincial and/or federal legislation.

1.3 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 (Building Temperatures)

- 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.

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 if applicable.

The following indoor pool water temperature settings apply to all City facilities operating pools 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 (Pools)

- Main pools should not exceed 29.4°C (85°F);
- Warm/teaching pools should not exceed 34.4°C (94°F);
- During the Summer (mid-June to mid-September), decrease the main pool temperatures to 28.9°C (84°F). For the remainder of the year, set at no higher than 29.4°C (85°F).

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

Policy Actions – Base Building Minimum Standards

- Domestic hot water tank temperature (50°C).
- Minimum light levels in offices, hallways, storage areas, etc. set according to IES guidelines and further detailed in Section 5.4.
- 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 the Energy Initiatives section approval.

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

The National Energy Code of Canada for Buildings (NECB) is an energy code for New Buildings that defines a set of minimum energy performance requirements for various building components. The *National Energy Code of Canada for Buildings 2017* (NECB), sets out technical requirements for the energy efficient design and construction of new buildings. NRC and NRCan are publishing this interim edition of the NECB in response to proposals received that improve the overall energy performance of buildings over the 2015 edition. Modelling for these changes indicates a potential energy efficiency improvement of between 10.3 and 14.4 % over the NECB 2011. The 2017 edition is an important step toward Canada's goal for new buildings, as presented in the Pan-Canadian Framework, of achieving 'Net Zero Energy Ready (NZER)' buildings by 2030.

In terms of Building environmental standards in this section, there are several general best practices that are recommended to be followed by any facility with HVAC equipment. These are listed below:

- Provide thermostats and controls that allow HVAC equipment to be controlled in each `Thermal Zone` within the facility.
- Provide Automatic Controls that shut-off ventilation systems when spaces are unoccupied and for nighttime setback of heating and cooling systems.
- Provide Outdoor Air Dampers that close automatically when the ventilation system is turned off.
- Provide ventilation `economizers` that can bring in extra outdoor air for free-cooling and water-side economizers that can save energy by bypassing the chiller plant.
- Right size equipment for each space and provide air-balancing to all areas. Use equipment with maximum possible efficiency for each application.
- Provide heat recovery of exhaust gases where feasible.
- Provide sealing of all ductwork, and insulation and protection of ductwork located outside of conditioned spaces.

1.4 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 (GHG reductions)
- Reduced Maintenance Costs and improved reliability
- Reduced Exposure to Energy Market Volatility (Risk Mitigation)
- Improved Working Environments
- Improved Productivity

1.5 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, Energy, Fleet and Facilities Management*. Typical projects include major capital replacements of chillers, boilers, roofs, windows, HVAC, 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 replacement projects.

Policy Actions – Project Approval Process

- This policy mandates the Energy Initiatives section involvement in the review of projects at the earliest possible concept stage. Energy Initiatives section 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 Energy Initiatives section 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 Energy Initiatives section 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. The main goal is to ensure we secure all eligible incentives.

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 by way of a purchase order prior to incentive 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 consumption reduction, demand reduction and cost savings;
- Emission reduction;
- 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, emission reduction 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 Energy Initiatives section:

Project information will be used by the Energy Initiatives section 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 and emissions are 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.

1.6 Major Renovations and New Construction

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

1.6.1 Evaluation of LEED and Green Building Design Options

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 design alternatives, according to end use requirements and budget constraints.

Such design alternatives include zero carbon buildings, which are buildings that are highly energy efficient and fully powered from on-site and/or off-site renewable energy sources or through procured carbon offsets to fully offset carbon emissions associated with the operations. The ZCB-Design Standard provides requirements that guide the design of new buildings and the retrofit of existing ones, to best empower buildings to achieve zero carbon operations. For ZCB-Design v2 certification, design must carefully consider embodied carbon, refrigerants and airtightness.

- 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:
 - Base case design;
 - LEED Certified design;
 - LEED Silver design (including ZCB).
- 2) New Construction - All new City facilities to be constructed will require a life cycle cost assessment of the energy, emissions, financial and environmental benefits associated with having the building constructed according to:

- Base case design;
- LEED Certified design;
- LEED Silver design (including ZCB);
- LEED Gold design (including ZCB);
- LEED Platinum design (including ZCB).

LEED and ZCB design 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 and greenhouse gas (GHG) emissions and result in lower ongoing operating costs.

Table 2: Sustainable Building Standards

Type	Space	LEED Gold (Including ZCB)	LEED Certified (Including ZCB)	Corporate Energy Policy (Section 5.11)
New Construction	>500m ²	✓		
	<500m ²		✓	
Major Renovations	>500m ²	✓		
	<500m ²			✓
Other Renovations	>500m ²			✓
	<500m ²			✓

1.7 Occupied Spaces Energy Management Policies

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

1.7.1 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 by an additional 2 degrees Celsius in an effort to reduce energy consumption. The Energy Initiatives section will monitor peak demand days on behalf of the City and will send notifications out to the client group to potentially shift loads to off peak hours (where operationally possible) as per Section 6.2 of this policy.

1.7.2 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 and for successful participation in events like Earth

hour once a year. There are two challenges to overcome with lights out program. The first is technological and 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.

1.7.3 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 1.3 of this policy.

2.0 EMISSIONS / GREENHOUSE GASES (GHG)

2.1 GHG Targets

The City of Hamilton's Corporate Energy and Sustainability Policy is integral to meeting the greenhouse gas emission reduction target of net zero emissions by 2050 relative to 2005 base year. These emissions are commonly known as operational carbon.

Corporately, achieving net zero greenhouse gas emissions means it is imperative that the City reduce its emissions sources. Efforts need to be focused on reducing consumption by utilizing energy efficient measures; moving toward more renewable energy sources (e.g. hydro, wind, solar, renewable natural gas) to power and heat City facilities and run City fleet; and potentially utilize emissions trading options as they become readily available.

Operational carbon is the carbon load created with the use of energy to heat and power a building. Embodied carbon, which is the carbon that is released in the manufacturing, production, and transportation of our building materials. As we continue to lower our operational carbon there will be a growing priority to also manage our embodied carbon. This will require development of a system of new targets and limits that will typically be found in new construction. In particular, LEED v4 speaks to embodied carbon and can be managed as per sections of this policy that relate to major renovations and new construction.

2.2 GHG Emissions Reporting

Policy Actions – Annual GHG Reporting

Reporting of Hamilton's corporate emissions will be coordinated and carried out by the Energy Initiatives section at least once per year. The results will be compiled and presented as per Section 1.2 of this policy and may be included in reporting of other City reporting requirements or those of associate membership groups as required.

2.3 GHG Protocol

Policy Actions – North American GHG Protocol

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

The North American 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 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.

2.4 Validation and Verification

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

3.0 FLEET AND TRANSIT FUEL CONSUMPTION

The City of Hamilton manages a fleet of corporate vehicles to provide fleet and transit services. The corporate fleet vehicles include various vehicle types such as buses, waste collection vehicles, snow clearing trucks, street sweepers, light weight departmental vehicles and Fire and EMS vehicles. The fuels used for these vehicles are diesel, dyed

diesel, unleaded gasoline, propane and compressed natural gas (CNG). Corporate Average Fuel Economy (CAFE) is the traditional method for measurement of the fuel consumed per 100km driven. It is used to monitor improvements in fuel consumption efficiency and fuel management activities at a high level. The City of Hamilton CAFÉ reflects various vehicles types in the fleet, which should not be confused with similar vehicle specific fuel efficiency data used by the industry. CAFE measurement and reporting excludes Fire, EMS, Police and the consumption and use of dyed diesel.

Policy Actions – Fuel Reduction Targets

Utilizing CAFE as a measurement tool, the long-term targets for the collective vehicle fleet (including Transit) is a 20% reduction in fuel economy by 2030 using 2012 as the base year. Reaching this level of improvement will be achieved through measures guided by fleet and transit plans and policies.

3.1 Fleet Vehicles

The Green Fleet Strategy will provide a framework to develop current Fleet policies that will speak to managing fuel and efficiency of the vehicles through purchasing policies, operator training, utilizing lower emissions fuels and evaluating CNG, Bio-fuels or alternate fueling methods (i.e. electric, hydrogen) for alternatives to traditional fuels. Furthermore, the City has an Anti-idling By-law and a corporate fleet policy for anti-idling that assists in reducing fuel consumption and emissions.

Reducing emissions from fleet vehicles is part of a broader GHG reduction strategy to move the City to net zero emissions in 2050 and will be achieved through measures outlined in the new Green Fleet Policy, which is owned and developed by Fleet. The latest version of the Green Fleet Policy is expected to be presented to Council in Q1 2021.

3.2 Transit Vehicles

The City's Transit division is committed to exploring new technology as it pertains to future bus procurement. For the past 6 years, Transit has been steadily replacing its diesel fleet with CNG- powered buses. This has a significant impact on reducing operating costs and a favorable impact on GHG emissions.

As viable technologies shift to more sustainable options such as electric or hydrogen fuel cell vehicles, Transit will consider non-traditional vehicle types as an addition or replacement to their fleet of buses, provided the vehicles and any associated infrastructure is economically and environmentally feasible and fits within parameters of its cohesive transportation plan for the City.

The City's fleet and transit vehicles represent 40-50% of GHG emissions for the City. Efforts made to reduce usage and emissions in this area will significantly impact the City's emissions inventory and is integral to meeting emissions targets. The CNG bus fleet will

assess credible supply options to integrate renewable natural gas (RNG) into the fuel supply to help off-set emissions.

4.0 HAMILTON WATER

Energy use by HW facilities and operations accounts for approximately 39% of the City's energy use and 28% of the associated costs in 2019. It is the City's single most significant cost and represents great potential for sustainability opportunities including efficiency and renewable energy.

Reducing energy and emissions 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 stormwater and wastewater and treating and delivering lower quantities of water. At all times water quality and reliable system operability remain the primary objectives.

Opportunities for improving energy efficiency fall into three general categories:

1. Equipment upgrades;
2. Operational efficiency;
3. Modifications to facilities.

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 facilities, such as installing energy efficient lighting, occupancy control and efficient heating and cooling equipment reduce the amount of energy consumed by the facilities themselves.

Policy Actions - Hamilton Water Monitoring and Targeting

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

- The base year for reporting results will be 2011, as applicable;
- Energy intensity for water pumping stations will be reported in terms of kWh/MLD/m;
- Energy intensity for treatment plants and wastewater pumping stations will be reported in terms of kWh/MLD;
- Maximizing renewable energy through ancillary production;
- Green House Gases and emissions will also be reported in tonnes CO₂e/MLD;
- Hamilton Water will implement an active strategy for cost efficiency while applying energy reduction/conservation methods.

An overall strategy and energy management plan that addresses the energy use at Hamilton Water will be developed and put in place to optimize energy intensity. This strategy will examine energy used for conveying and maintaining distribution of water, water treatment, stormwater and wastewater 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 for renewable energy generation. Through this policy, the Energy Initiatives section will be consulted and provide input for 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 Energy Initiatives section manage and operate the facility in a similar role to other existing operations (HRPI, Biogas, District Energy and Solar).

5.0 SPECIFIC POLICIES

5.1 Energy Reserve

The Energy Reserve was established to fund the Energy Initiatives section 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, Energy Initiatives section;
- Payback capital outlay;
- Mitigate unforeseen energy cost increases or budgetary shortfalls during the current budget cycle as a result of regulatory or utility rate adjustments;
- Energy audits and feasibility studies;
- Pilot projects for new energy technologies and renewable energy projects;
- Fund incremental retrofit project costs of higher efficiency options;
- Education 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 Energy Initiatives section.
- The Energy Initiatives section is also involved in reviewing historical billings from all energy suppliers. Under the microscope and with the group's specific knowledge and experience, the Energy Initiatives section 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 Energy Initiatives section 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 and directed as established within the Project Charter for the specific project as agreed to by all involved parties.
- 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.
- Regarding City Boards and Agencies, the Energy Initiatives section 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 Energy Initiatives section and the Board or Agency.

Policy Actions – Energy Reserve

The Energy Reserve (112272) funds staffing costs for the Energy Initiatives section. 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, Energy Initiatives section to ensure compliance with the Corporate Energy and Sustainability 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 related recoveries will be returned to client budget, previous year related 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 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.

5.2 Verification and Validation of Utility Bills

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

Policy Actions – Policy Action – Utility Bills Funds Recovery

Funds recovered through this activity will be deposited into the Energy Reserve with the following rules to apply:

- Billing recovery for costs related to usage from the current budget year will be returned to the client budget;
- Billing recovery for costs related to usage from the previous budget year will be deposited in the Energy Reserve.

5.3 Energy and Emission Reduction Projects - Lifecycle Cost Analysis

Policy Actions – Lifecycle Cost Analysis

Energy and emission related projects will be evaluated by the design/project team using Lifecycle Cost Analysis. This analysis must depict energy and emission reductions and the financial payback for the best overall outcome 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 and emission reduction in order to make the appropriate decisions based on capital and operating budget constraints.

5.4 Lighting Technology

Policy Actions – Energy Efficient lighting Solutions

- The City will endeavor to use the most energy efficient and latest proven lighting technology as per current government Act, Regulation and or recommendation. The latest proven lighting technology has moved to the light emitting diode (LED) which is both highly efficient and a very long life which significantly reduces maintenance costs. To ensure optimum efficiency and quality, lighting shall be either Energy Star or Design Lights Consortium (DLC) Listed.
- The City will endeavor to further reduce electrical consumption by installing, where applicable, lighting controls including but not limited to daylight harvesting, occupancy, photocell and building automation system (BAS) controls.
- The City is committed to replacing or eliminating incandescent lighting where possible in order to comply with Energy Star or Design Lights Consortium Listings and any government Act, Regulation and or recommendation.

Lighting levels will be based on IES guidelines and be compliant with the Ontario Building Code (OBC). See attached links in References Section for additional lighting information.

5.5 Energy Management Standard – Building Automation Systems (BAS)

Policy Actions – BAS Modernization and Standardization

The introduction of multiple vendors created a need for a standard BAS specification that was developed by documenting the City's requirements.

- A master BAS specification will set out City's expectations that all vendors must adhere to and guidelines for hardware, software, and communication protocols.

BAS modernization policy to achieve goals and objectives noted below shall apply to:

- **New Construction:** All new City facilities to be constructed shall be evaluated for BAS installation using City's master BAS specification based on capital cost requirements, expected annual energy consumption reduction, and reasonable project payback. A general rule of thumb can be either a site of greater than 500 m² of gross floor area or annual energy consumption of over 500,000 equivalent kWh (ekWh).
- **Major Renovations (>50% gross floor area):** All major renovations of City owned facilities of greater than 50% of their gross floor area shall be evaluated for BAS retrofit using City's master BAS specification based on capital cost requirements, expected annual energy consumption reduction, and a reasonable project payback.

Moving towards a concept of internet-based open protocol Building Automation Systems (BAS) will ensure that the City will have the ability to obtain competitive pricing from a list of BAS vendors that are already pre-qualified. Using these approved prequalified BAS vendors list will provide the City with an ability to have this open system and eliminating a potential need of corporate BAS service Contracts. City staff will also provide inputs to refine and establish effective and efficient control strategies to optimize equipment performance without sacrificing occupant’s comfort or productivity.

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 modernization moving forward through this policy are:

- Capital and maintenance cost reduction;
- Optimization of the existing BAS for energy consumption reduction 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.

The following table presents a summary of these generic guidelines:

Table 3: BAS Modernization Guidelines

Type	Gross Space	BAS Modernization	Annual Energy Consumption - ekWh	BAS Modernization
New Construction	>500m ²	✓	>500,000	✓
	<500m ²		>500,000	✓
Major Renovations	>500m ²	✓	>500,000	✓
	<500m ²		>500,000	✓

5.6 Roof Capital Replacement Evaluation

Policy Actions – Roof Replacement

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. This process should also include the analysis of increasing the R value of the roof insulation if applicable.

5.7 Energy Efficient Equipment Purchasing

Policy Actions – Energy Efficient Equipment

When purchasing new equipment and appliances, the most optimal energy efficient option should be selected.

Equipment standards are identified through a long-standing standard of performance called ENERGY STAR®. The City will use Energy Star 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
- Lamps 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).

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 premium efficiency motors as minimum standards. Where required the Energy Initiatives section will provide recommendations on minimum efficiency standards.

5.8 Energy Education and Awareness

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

5.9 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. The City will 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.

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

- 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 Energy Initiatives section.
- The City will only construct clean or green generation, cogeneration, biomass or renewable energy projects.
- 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.
- The Energy Initiatives section 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.
- 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.).

5.10 Emergency Generators / Back-up Power Systems

Policy Action – Emergency Generators and Back-up Power Systems

The Energy Initiatives section is to be included, with adequate time, in the review of Emergency Generators and Back-up Power Systems, noting the following:

- All new or retrofit emergency and back up generation as well as back-up power system projects be evaluated well in advance of commitment to ensure all technical, environmental impacts, and energy related issues have been considered;
- All 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 back-up generation 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” when favorable market conditions exist.

5.11 Sustainable Buildings Policy

Policy Action – Sustainable Buildings

The City of Hamilton will establish, implement and maintain sustainable building practices for all new builds during the acquisition, planning, design, construction, operations, maintenance, renovation, and decommissioning to meet or exceed the requirements as summarized through section 5.11 below;

5.11.1 Sustainability in Design and Construction of City-Owned Buildings:

Further to section 1.6, for new builds or major construction new City-Owned buildings will be designed and constructed in a manner that mitigates the risks and impacts of future energy and carbon pricing (e.g., through passive design strategies, durable energy conserving building envelopes, etc.) and provides flexibility to incorporate emerging technologies that become cost effective in the future. (e.g., solar ready roofs, provisions for future geothermal, energy storage, etc.)

- The City will recognize the significant resource requirements and greenhouse gas impacts of new construction, as well as the value of the embodied carbon in its existing building stock. The ZCB-Design Standard provides requirements that guide the design of new buildings and the retrofit of existing ones, to best empower buildings to achieve zero carbon operations.

- As part of the business case development, the City will assess whether an identified real estate need of its programs or services can be met through its existing building portfolio and achieved in the absence of new construction.

5.11.2 Sustainability in existing City-Owned buildings:

The City will demonstrate excellence in sustainable practices in existing City-Owned Buildings and City-occupied buildings through the establishment of a BOMA BEST-like certification program or similar. Sustainable building practices employed by the City shall include:

- Monitoring and benchmarking the performance of all City-owned buildings;
- Conducting energy efficiency audits to identify opportunities for improvement;
- Integrating energy modeling, energy audits, lifecycle cost benefit analysis and sustainable return on investment analysis methodologies into routine lifecycle replacement and capital rehabilitation planning processes;
- Strengthening the integration and accountability with the Corporate Greenhouse Gas Management Plan through the creation of multi-year building energy retrofit plans that align with budget cycles, outline proposed energy efficiency and emission reduction upgrades, provide project-specific details and anticipated lifecycle cost benefits;
- Establishing requirements for determining an optimal building portfolio upgrade/retrofit strategy that extends over multiple budget cycles in support of the Corporate Greenhouse Gas Management Plan and creating a path to zero-carbon emissions for the building portfolio;
- Publicly sharing and communicating its sustainable building practices through the establishment and implementation of a Green Building Education Program that incorporates both passive public education tactics (e.g., building signage and online information) and active public engagement and awareness.

5.11.3 Sustainability in City Acquisition of Existing Buildings:

Prior to the acquisition of an existing building the City intends to retain for its own use or for lease to others, the City shall require an energy assessment be performed and integrated into the existing pre-acquisition process. The energy assessment will determine the building's energy consumption and greenhouse gas performance and the extent of upgrades needed to raise the energy performance to an optimized level of lifecycle cost benefit.

5.11.4 Sustainability in City Owned Buildings Leased to Others:

The policy standards for existing City-owned buildings (that are leased to others who are also responsible for sustainable building practices in those buildings) applies only when incorporated within the leasing agreements at the time of lease renewal or creation of a new lease agreement.

5.11.5 Sustainability in City-leased Buildings:

The City will understand the energy use and greenhouse gas impacts of the buildings it leases from others prior to entering leases and will consider these impacts as a part of its selection criteria.

5.12 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 Actions – Monitoring and Verification

Project M&V option (Basic or Enhanced) shall be driven by incentive program requirements or as directed by the Energy Initiatives section throughout this section 5.12.

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 Energy Initiatives section 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 simulation models using industry standard tools such as RETScreen from Natural Resources Canada. The Save on Energy web-site also provides a detailed guideline on Project Measurement and Verification Procedures which can also be used as a reference document.

When an energy retrofit project is initiated within the City of Hamilton, both the energy savings for the project and the associated Greenhouse Gas (GHG) emission reductions are to be determined for business case summaries. These numbers may also be used to begin energy project incentives process and may, therefore, require energy savings verification for third party sources.

5.13 Building Labelling

Policy Actions – Building Labelling

The City will adopt an industry standard building ranking energy system for appropriately sized corporate buildings. The Energy Initiatives section will assess these buildings and assign them the rankings using industry standard appropriate tools. These tools will act as a benchmark comparing similar buildings and similar end uses on an energy intensity basis. This will also assist the City with energy education and awareness for staff. Building labelling will also assist in targeting the opportunities for improvement and acknowledging high performing areas.

6.0 SPECIFIC POLICIES – ENERGY PROCUREMENT

Policy Actions – Energy Procurement

The following areas will be managed by the Energy Initiatives section as indicated throughout Section 6.

6.1 Demand Response

The Energy Initiatives section will promote the utilization of City owned assets that can contribute 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 Energy Initiatives section will be granted authorization to enter into such agreements on behalf of the City of Hamilton.

6.2 Peak Demand Response and Tracking

The Energy Initiatives section will undertake the daily evaluation of provincial demand, weather and temperature and price forecasts that can indicate a potential peak demand day. Such tools and information used to anticipate when peak hours are most likely to occur include time of year, time of day, the Independent Electricity Service Operator (IESO) demand forecasts and IESO real time peak market information.

During high provincial demand periods with the potential for peak demand days, which are typically associated with the highest peak prices for electricity and potential for peak setting for the IESO's Industrial Conservation Initiative (ICI) customers, the Energy Initiatives section will notify City sites via email of this potential demand period.

If site operators can reduce demand during the peak period without compromising operations and public health and safety, they shall endeavor to do so. This can include, but is not limited to:

- Lowering or adjusting operational activities to non-peak times;
- Adjusting temperature settings in buildings;
- Shutting off non-essential lighting and/or computers; and
- Lowering blinds or closing curtains to reduce heat or cooling escape.

6.3 Transportation Fuels

The Energy Initiatives section will assume the role of procuring and managing the wholesale contracts for 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 Energy Initiatives section, as will any future transportation type fuels such as Compressed Natural Gas (CNG), Liquefied Natural Gas (LNG), electricity or hydrogen. These fuels will be procured according to the direction and guidelines set out in the existing Energy Commodity policy.

6.4 Utility Supply and Rate Management

The Energy Initiatives section will evaluate utility rates (electricity, natural gas, water and waste water) for the City on an ongoing basis considering evolving energy requirements, energy market regulations and supply conditions/ contacts and the City's commodity supply arrangements. The Energy Initiatives section 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 favorable to the City. The Energy Initiatives section will manage all City customer energy use data for the City's district heating, cooling, natural gas and electricity end-use customers.

6.5 Energy Contract Management

The Energy Initiatives section 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.

6.6 Renewable Energy

Although renewable and non-renewable energy both produce carbon emissions, renewable energy has a lesser to almost zero carbon emissions. compared to fossil fuels.

Policy Actions – Renewable Energy

- The City will consider, evaluate and pursue feasible renewable energy opportunities to reduce usage from traditional energy sources and to reduce emissions overall;
- The Energy Initiatives section to be included in all corporate renewable energy project evaluations prior to commitment by the City;
- The Energy Initiatives section consider acquisition of renewable energy and/or utilizing carbon credits trading as a method of meeting targets if required.

The Energy Initiatives section will work in close association with Hamilton Renewable Power Inc. (HRPI) to advance the development and growth of renewable energy for the

City of Hamilton. The Energy Initiatives section will manage existing and future operations of renewable energy sites. Existing sites include HRPI Cogeneration plants located at 900 Woodward Ave. and the Glanbrook land fill. Furthermore, a 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 Enbridge distribution system.

Additional renewable energy opportunities, strategies and initiatives will be pursued through HRPI or the City as opportunities arise. These activities will reduce greenhouse gas emissions, maximize revenue generation for the City. This includes accessing incentives, participation in the assessment of alternatives and the operation and management of any installation.

Going forward and in order to meet our low emission targets it is very likely the City will need to acquire renewable energy to meet these long-term targets. However, this type of purchase should only come after all available options have been exhausted which include installing high efficiency measures first, as applicable.

Where it is found to be feasible and land and space may be available, the Energy Initiatives section supports developing renewable energy generation and where feasible, energy storage systems. Wind and Solar Energy systems may also be investigated to help offset GHG emissions from electrical energy use, especially during peak day events.

The Energy Initiatives section should be included in all corporate renewable energy project evaluations prior to commitment to ensure all legal, technical and energy related issues have been considered.

In addition, the Energy Initiatives section will evaluate any emissions reductions opportunities and/or potential for emissions/carbon credits trading in so much as they are available, economically feasible and offer verifiable options for meeting our emissions targets.

7.0 ENERGY COMMODITY POLICY

Policy Actions – Energy Commodity Policy

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

7.1 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 section.

“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.

7.2 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.

7.3 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 the 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 the 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 section **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.

7.4 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.

7.5 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).

8.0 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 FirstOntario Centre, the Central Library and Farmer’s Market, FirstOntario Concert Hall, Convention Centre, Parking Garage, Ellen Fairclough Building, Art Gallery, McMaster and Hamilton City Hall.

“**CDM or Energy CDM**” means Energy Conservation and Demand Management

“**Embodied Carbon**” is the sum of all the greenhouse gas emissions (mostly carbon dioxide) resulting from the mining, harvesting, processing, manufacturing, transportation and installation of building materials.

“**Energy Intensity**” means equivalent kilowatt-hours (kWh) per square foot of a building. 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.

“**Facility**” shall include all **City owned** buildings and grounds e.g. parks and recreation facilities.

“**GJ**” means giga-joule

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

“**IES**” means Illuminating Engineering Society – The Lighting Authority

“**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 metre

“NECB” means National Energy Code of Canada for Buildings

“Net Zero” means achieving overall, zero greenhouse gas emissions by balancing any emissions from energy use with carbon removal via a combination of reducing usage, changing to low or zero energy sources (i.e. renewable energy sources) changing agricultural and industrial processes and carbon offsetting.

“OBC” means Ontario Building Code

“OEB” means Ontario Energy Board

“Operational Carbon” is used to describe the emissions of carbon dioxide and other global warming gases during the in-use operation of a building.

“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.

9.0 REFERENCES

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<https://www.ontario.ca/page/climate-change-action-plan>

MOE – Climate Change – Reporting on Emissions

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

GHG Protocol

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

Reports:

Energy Efficiency Trends in Canada

<https://oee.nrcan.gc.ca/publications/statistics/trends/2016/index.cfm>

Ontario's Long Term Energy Plan

<https://www.ontario.ca/page/ontarios-long-term-energy-plan>

The Intergovernmental Panel on Climate Change

<https://www.ipcc.ch/>

ICLEI – Local Governments for Sustainability

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

Incentives:

SaveOnEnergy Programs

<https://www.saveonenergy.ca/> Enbridge (Union Gas) conservation programs

Natural Gas Programs

<https://www.uniongas.com/business/save-money-and-energy>

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>

The Ontario Building Code

<http://www.buildingcode.online/>

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>

Illuminating Engineering Society – The Light Authority (IES)

<https://www.ies.org/>

Design Lights Consortium (DLC)

<https://www.designlights.org/>

Regulated/Energy Boards:

National Energy Board (NEB)

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

Ontario Energy Board (OEB)

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

Local Utilities:

Alectra Utilities

<https://alectrautilities.com/>

Enbridge Gas Inc. (Union Gas)

<https://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/>

Dawn Storage & pricing HUB

<https://www.uniongas.com/storage-and-transportation/about-dawn>

IESO (demand & market prices)

<http://www.ieso.ca/Power-Data/Data-Directory>

IESO (Global Adjustment)

<http://www.ieso.ca/Sector-Participants/Settlements/Global-Adjustment-Class-A-Eligibility>

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<http://www.ieso.ca/Power-Data/Price-Overview/Hourly-Ontario-Energy-Price>

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

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

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CME

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INO

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