

City of Hamilton CDM Plan 2019

CONSERVATION AND DEMAND
MANAGEMENT 5 YEAR PLAN 2019-2023



Hamilton

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1. INTRODUCTION

The City of Hamilton (the “City”) continues to demonstrate its commitment to managing its corporate energy and emissions portfolio. Tracking, measuring and reporting help focus our efforts to meet the City’s long-term targets.

1.1. Overview

The development of the City of Hamilton’s Conservation and Demand Management (CDM) Plan is intended to meet the expectations under the Broader Public Sector (BPS) Energy and Reporting Conservation and Demand Management Plan (Ontario Regulation 507/18). Moreover, it is a strategic plan to outline and highlight previous, current and proposed energy efficient measures within the City to reduce its Corporate energy usage and greenhouse gas (GHG) emissions. The requirements under Ontario Regulation 507/18 are to 1) Report annually to the Ministry of Energy, Northern Development and Mines on their energy use and greenhouse gas (GHG) emissions and publish the reports on their websites (as of July 1, 2013) and 2) Develop a five-year conservation plan and publish the plan on their websites. Plans must be updated every five years (as of July 1, 2014)

The City’s Corporate Energy Policy (CEP) was submitted in 2014 as part 2 of the requirement (the 5-year CDM plan). This plan is the second 5-year CDM plan submitted for the City as part of Ontario Regulation 507/18.

1.2. Background to the City of Hamilton

Hamilton is a port city located at the west end of Lake Ontario on the Golden Horseshoe. It has a population of over 530,000¹. In 2001, the current boundaries of Hamilton were created through the amalgamation of the original city with other municipalities of the Regional Municipality of Hamilton-Wentworth. The City of Hamilton now includes the city of Hamilton, city of Stoney Creek, the town of Ancaster, the town of Flamborough, the town of Dundas and the township of Glanbrook on over 1100 km² of land.

The City manages a large number and variety of public service buildings, and they fall into the general categories of:

¹ Population of 536,917 as per 2016 Census.

Figure 1: Building Type Descriptions

Portfolio Category	Description
City/Town Halls	Includes City Hall and additional Municipal Service Centres
Corporate Facilities	Includes sites such as Animal Control or Hamilton Wentworth Courthouse
O&M	Operational accounts typically non-building energy users such as street lighting or traffic signal lighting
Water and Wastewater	Hamilton Water facilities including those for treatment, pump stations and reservoirs
Yards	Includes work yards, garages, and equipment or vehicle storage sites.
Arenas	May also include multi-use sites where an arena is attached
Community & Senior Centers	Non-aquatic or arenas
Recreation Centres/ Pools	Aquatic Centres or outdoor pool facilities
Recreation Parks, Stadiums & Golf	Includes Parks with community buildings, Tim Horton's Field and Chedoke and Kings Forest golf courses
Lodges	Senior living & care facilities
Culture	Includes historical sites and museums
Fire & EMS	Includes fire stations, emergency services buildings and training centre
Libraries	Includes Hamilton Public Library sites (Owned, not leased)
Entertainment Venues	Includes FirstOntario Centre, FirstOntario Concert Hall and Hamilton Convention Centre
Hamilton Police Services	Includes sites owned not leased

2. PLAN DEVELOPMENT

2.1. Plan Alignment


In 2006 the City created an Office of Energy Initiatives (OEI) to address the City's rising energy usage and costs, improve energy efficiency in buildings and operations and explore renewable energy options. The role of the OEI is to provide continuous improvement of energy efficiency through utility and commodity management, energy engineering, renewable energy and new technology. The OEI is part of the Energy, Fleet and Facilities Management division – a division within Hamilton's Public Works department. The division focuses primarily on corporate building/site and vehicle assets. A Corporate Energy Policy (CEP) was developed in 2009 and further updated in 2014. It was designed to help guide the City around making energy-related decisions for its corporate assets that would help achieve targets aimed at reducing the City's energy usage and carbon footprint. Details on the CEP itself are outlined in section 2.2 below.

In addition to complementing the goals of the OEI and the CEP, the development of this CDM Plan aligns with other initiatives and plans underway at the City.

The City's overall Strategic Plan for 2016-2025² highlights several strategic priorities to support conservation efforts and aligns with Hamilton's overall mission **to provide high quality cost conscious public services that contribute to a healthy, safe and prosperous community in a sustainable manner.**

The Strategic Plan for 2016-2025 details cross departmental priorities aimed at achieving the City's vision to be the best place to raise a child and age successfully.

The City of Hamilton's Strategic Plan 2012-2025 priorities are:

-  **Community Engagement & Participation**
Hamilton has an open, transparent and accessible approach to City government that engages with and empowers all citizens to be involved in their community.
-  **Economic Prosperity and Growth**
Hamilton has a prosperous and diverse local economy where people have opportunities to grow and develop.
-  **Healthy and Safe Communities**
Hamilton is a safe and supportive city where people are active, healthy, and have a high quality of life.
-  **Clean and Green**
Hamilton is environmentally sustainable with a healthy balance of natural and urban spaces.
-  **Built Environment and Infrastructure**
Hamilton is supported by state of the art infrastructure, transportation options, buildings and public spaces that create a dynamic City.
-  **Culture and Diversity**
Hamilton is a thriving, vibrant place for arts, culture, and heritage where diversity and inclusivity are embraced and celebrated.
-  **Our People and Performance**
Hamiltonians have a high level of trust and confidence in their City government.

The priorities are incorporated into many city services that impact or are impacted by policies and plans related to energy efficiency, environment and climate change actions that also align with the CDM plan.

Community focus on climate actions and air quality resides within Hamilton's Healthy Environments division in the Healthy and Safe Communities Department. There are several community and global action groups that Hamilton actively participates in. As part of membership in these groups, the City may provide data reporting, participate in round table strategy meetings and conferences, and form working partnerships to elevate the importance of climate change action and emissions and energy use reduction for Hamilton.

² City of Hamilton Strategic Plan 2016-2025 found online: <https://www.hamilton.ca/city-initiatives/priority-projects/2016-2025-strategic-plan>

Figure 2: Listing of Groups the City Holds Membership As it Relates to Energy and Environment

Member Since	Partnerships/Participants/Members of:
1994	FCM’s Partnership for Climate Change Program
1998	Clean Air Hamilton
2004	Clean Air Council
2013	Carbon Disclosure Project
2014	Global Covenant of Mayors
2017	Sustainable Hamilton Burlington
2017	Blue Dot
2018	Bay Area Climate Change Office/ Bay Area Climate Change Council
2015	ICLEI Building Adaptive and Resilient Communities Program
	Ontario Climate Consortium

2.2. Corporate Energy Policy (CEP)³

As noted above, the City first developed a Corporate Energy Policy in 2009. The current iteration of the Policy was approved by council in 2014. The policy is designed to act as a guideline for making energy-related decisions as it pertains to corporate assets. The CEP was submitted as the original CDM Plan in 2014 in accordance with Ontario Regulation 397/11.

The current policy is designed to:

- Facilitate the achievement of City-wide energy and emissions reduction targets;
- Address legislated reporting requirements;
- Define policies for capital investments as it pertains to energy;
- Define policies related to energy procurement; and
- Address regulations concerning GHG emissions.

Policy actions outlined within the CEP supports building and process improvements that lead to energy usage reductions and emissions reductions. In addition, the CEP solidifies targets related to energy intensity reductions, greenhouse gas (GHG) emissions reductions and corporate average fuel economy. The policy incorporates the previously separate Energy Commodity Policy, as well as policies around establishing steering committees, mitigation of energy and fuel consumption, Hamilton Water facilities and Fuels.

Current Targets

The specific targets as identified in the CEP and reported on annually are noted below.

³ Corporate Energy Policy updated 2014 found online: <https://www.hamilton.ca/city-initiatives/strategies-actions/office-energy-initiatives>

Figure 3: Corporate Energy Intensity and Emissions Reduction Targets

Base Year 2005		
Year	Energy Policy Energy Intensity Reduction Target	Emissions Reduction and Offset Target
2020	20%	20%
2030	45%	50%
2050	60%	80%

Figure 4: Corporate Average Fuel Economy (CAFE) Target

Base Year 2012		
Year	Diesel L per 100KM	Unleaded Gasoline L per 100KM
2030	20%	20%

The CEP is currently undergoing a review and is included as part of this CDM Plan for 2019, with the intent to update, where required, policies pertaining to buildings and building systems, vehicles and fuels and regulatory requirements. See section 5.1.

3. ENERGY DATA – CURRENT

3.1. City of Hamilton Energy Profile

Corporately, the City tracks and reports on electricity and natural gas usage for all City-owned and operated buildings. In addition, it tracks and reports on vehicle fuels (diesel, unleaded gasoline and compressed natural gas) for the City-owned fleet. The most current information is for the 2018 calendar year. Detailed information can be found within the City of Hamilton’s 2018 Annual Energy Report⁴.

City Facilities - Usage

In 2018, the City had a combined energy usage of over 350 million equivalent kilowatt hours (ekWh). The usage reported is for City-owned buildings/sites and excludes CityHousing Hamilton. Of further note is that sites linked to a district energy system with utilities provided from HCE Energy Inc. are included within electricity or natural gas respectively. Natural gas reported below is for buildings only. Natural gas used as a fuel for vehicles is reported separately.

⁴ Report can be found online: <https://www.hamilton.ca/city-initiatives/strategies-actions/office-energy-initiatives>

Figure 5: 2018 Electricity and Natural Gas Facilities Usage

City Owned Facilities Usage	2018
Total Electricity (kWh)	216,150,047
Total Natural Gas (m ³)	12,788,880
Total Combined (ekWh)	350,049,621

Figure 6: 2018 Electricity and Natural Gas Facilities Usage by Portfolio

2018 Consumption	Electricity (kWh)	Natural Gas (m ³)	Total Combined (ekWh)
City/Town Halls	4,071,714	442,664	8,706,404
Corporate Facilities	5,323,374	389,792	9,404,499
O&M	28,082,619	36,870	28,468,646
Water and Wastewater	104,445,981	2,131,657	126,764,430
Yards	8,931,185	1,869,336	28,503,129
Arenas	14,725,039	2,064,935	36,344,907
Community/Senior Centers	1,188,103	224,282	3,536,338
Rec Centres/Pools	6,693,398	1,760,926	25,130,292
Rec Parks/Stadiums/Golf	7,220,284	462,001	12,057,438
Lodges	5,132,468	953,260	15,113,101
Culture	2,005,023	279,530	4,931,697
Fire/ EMS	4,775,906	767,768	12,814,438
Libraries	8,227,621	284,979	11,211,349
Entertainment Venues	10,697,187	744,259	18,489,575
Police	4,630,145	376,622	8,573,378
Totals	216,150,047	12,788,880	350,049,621

City Facilities – Energy Intensity

One of the key performance indicators for the City’s facilities in its annual reporting and outlined in the CEP targets is energy intensity. Energy intensity is the measurement of consumption in equivalent kilowatt hours per square foot (ekWh/sqft) of conditioned space. Conditioned space refers to the usable, occupied space of a site and not simply the square footage of the overall site. Operational usage is not included. (i.e. street lighting, traffic lighting).

Figure 7: Energy Intensity Comparison 2018 to Base Year (2005)

Total ekWh per sqft	2005	2018	Energy Intensity Comparison
City/Town Halls	40	24	-39%
Corporate Facilities	45	22	-51%
O&M	n/a	n/a	n/a
Water and Wastewater	n/a	n/a	n/a
Yards	38	30	-22%
Arenas	51	43	-15%
Community/Senior Centers	31	25	-20%
Rec Centres/Pools	79	67	-15%
Rec Parks/Stadiums Golf Courses	37	25	-33%
Lodges	114	44	-62%
Culture	36	31	-12%
Fire/ EMS	45	37	-17%
Libraries	25	31	25%
Entertainment Venues	30	28	-9%
Police	60	36	-39%
Total Usage (ekWh) per sqft	46	34	-25%

Vehicle Fleet

The City’s fleet primarily consist of Transit buses (HSR), waste collection vehicles, snow removal trucks, street sweepers, departmental vehicles (i.e. medium and light duty vehicles), and Fire and Emergency Services (EMS) vehicles.

For 2018, the City consumed over 16 million diesel litre equivalent (DLE) of fuels for its vehicle fleet.

Figure 8: 2018 Fuels Consumption in Diesel Litre Equivalent (DLE)

Fuel Type	Consumption Litres
Diesel	9,172,662
Unleaded Gasoline	2,248,360
CNG (DLE)	5,104,215
Total	16,525,237

Figure 9: 2018 Fuels Consumption in Diesel Litre Equivalent (DLE) by Fuel Portfolio

Group	Diesel Litres	Unleaded Litres	CNG DLE	Total (DLE)
Energy, Fleet & Facilities	40,120	119,211	-	159,331
Engineering Services	-	42,511	-	42,511
Environmental Services	1,069,975	392,993	-	1,462,968
Hamilton Water	176,880	187,510	-	364,391
Operations	1,303,828	370,547	-	1,674,376
Transportation	84,945	46,876	-	131,821
Other	362,535	1,001,706	-	1,364,242
Transit	6,134,378	87,005	5,104,215	11,325,598
Total	9,172,662	2,248,360	5,104,215	16,525,237

One of the key performance indicators for the City’s vehicle fleet in its annual reporting and outlined in the CEP targets is Corporate Average Fuel Economy (CAFE). CAFE is the amount of fuel consumed in diesel litre equivalent (DLE) per 100 kilometers (km) of distance travelled.

Figure 10: 2018 CAFE Comparison to Base Year (2012)

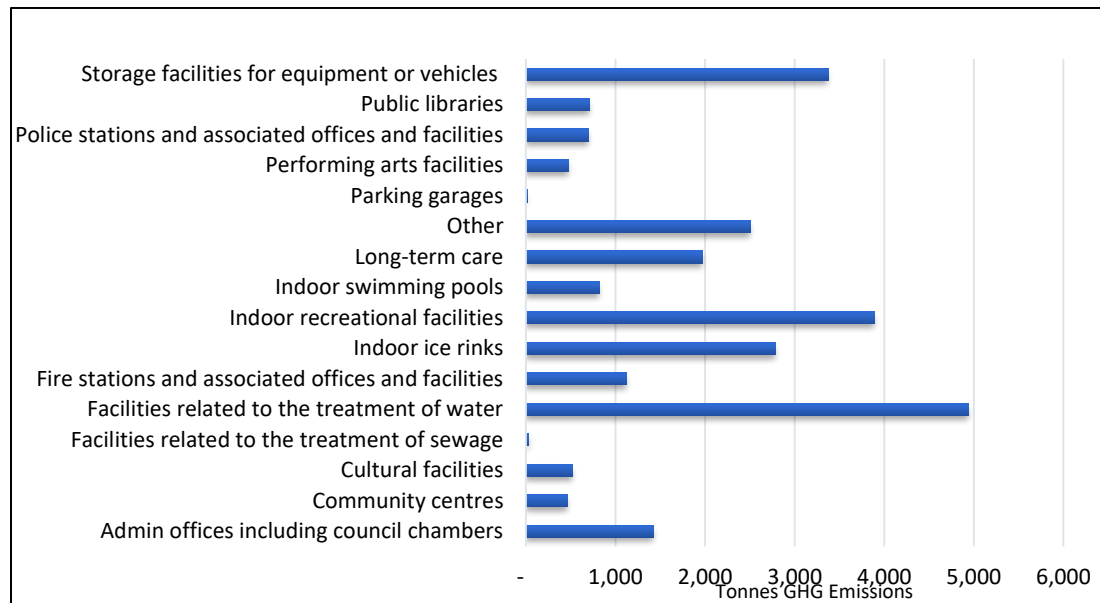
Diesel Litre Equivalent (DLE) per 100 KM	BASE (2012)	2018
Unleaded Gasoline	20.7	19.4
Diesel	54.5	54.1
CNG	66.2	70.7
Total	46.2	44.8
Overall % Changed in DLE/100 KM		-3%

GHG Emissions – Ontario Regulation 507/18 Annual Reporting

The City submits the annual reporting data for GHG emissions as part of the adherence to Ontario Regulation 507/18. Annual reporting will continue as required.

The latest submission, July 2019 is for the calendar year 2017. According to the reporting formula City-owned corporate facilities (building only) were responsible for emitting 25,779 tonnes of CO₂e. The categories for this reporting requirement do vary from the City’s internal reporting and are limited to buildings only. However, they do continue to represent corporately-owned assets only.

Figure 11: 2017 GHG Emissions Results under O.Reg 507/18 Requirement



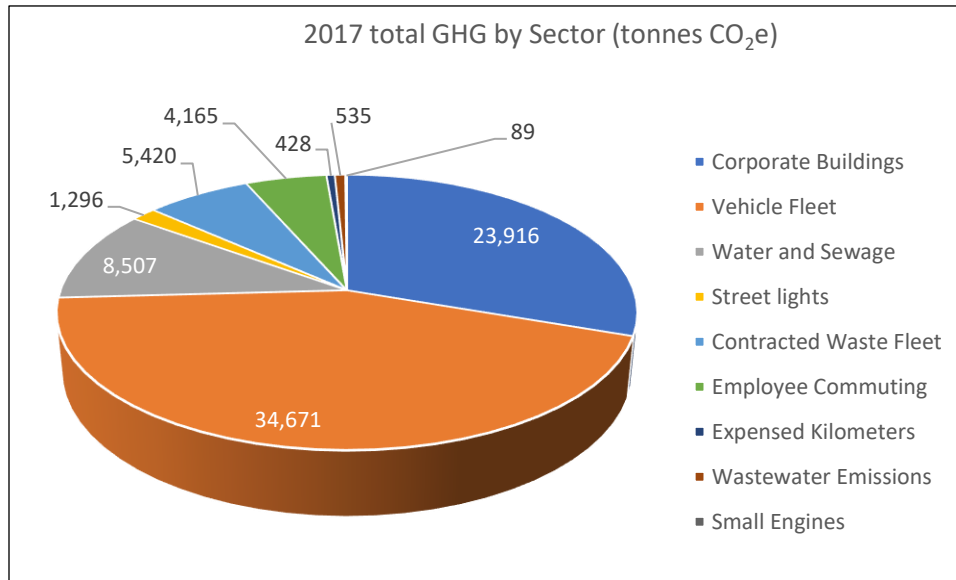
GHG Emissions – City Inventory

In addition to the requirements Ontario Regulation 507/18, the City had previously committed to reporting its inventory based on the GHG Emissions protocol. GHG emissions related to corporate operations have been inventoried and reported annually since the adoption of the Corporate Air Quality and Climate Change Strategic Plan (PED06336(a)) in 2008.

Original targets of a 20% reduction by 2020 were then updated and aligned with the Corporate Energy Policy and the Board of Health Climate Change Actions 2012 report (BOH13024), calling for an 80% reduction in GHG emissions by 2050 from the base year 2005. This inventory is included in the Annual Energy Report. The information differs slightly from what is reported as per the Ontario regulations, where the categories are pre-set and facility-based only. The City inventory includes corporate emissions-related activities for corporate building assets, street and traffic lighting, corporate vehicle fleet including small vehicles, water and sewage related, employee commuting and employee expensed kilometer usage.

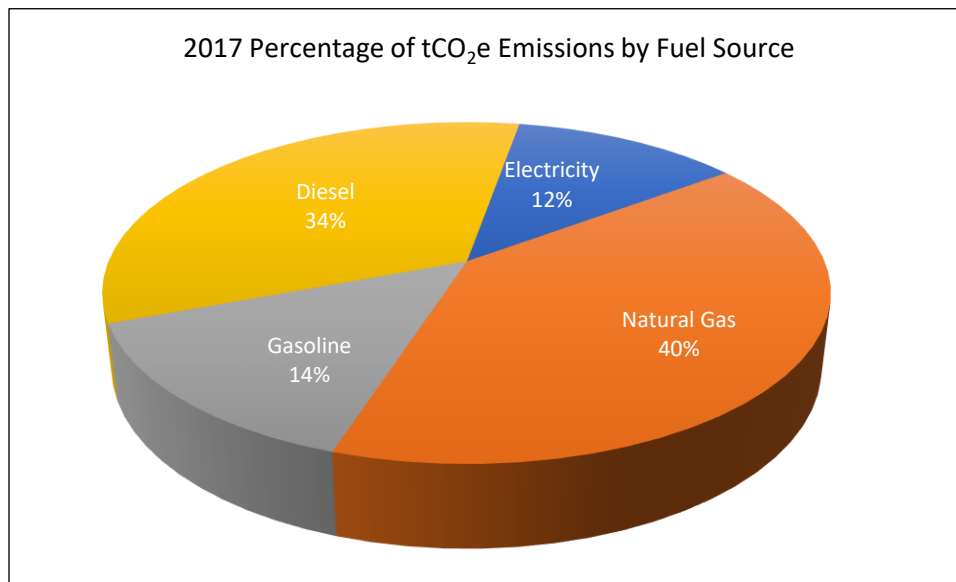
The most current GHG inventory was completed for 2017. In 2017, the GHG emissions inventory was 79,028 tonnes of CO₂e (carbon dioxide equivalent). The inventory does not include Hamilton Renewable Power Inc. (HRPI) operations.

Figure 12: 2017 total GHG Inventory by Portfolio Sector



Our corporate GHG emissions are generated by the following energy sources: electricity, natural gas, diesel and gasoline.

Figure 13: 2017 Percentage of Emissions by Fuel Source



3.2. Past Energy Performance

As outlined in the CEP, the City established a base year of 2005 for which to target energy usage, energy intensity and GHG inventory reductions. For this CDM Plan update, the last five years were to be reviewed and reported on. For the purposes of this Plan, both 2005 results and the results of the past five years of data will be presented.

City Facilities – Usage

Figure 14: Total Electricity Consumption Past 5 years and Base Year (2005) Comparison

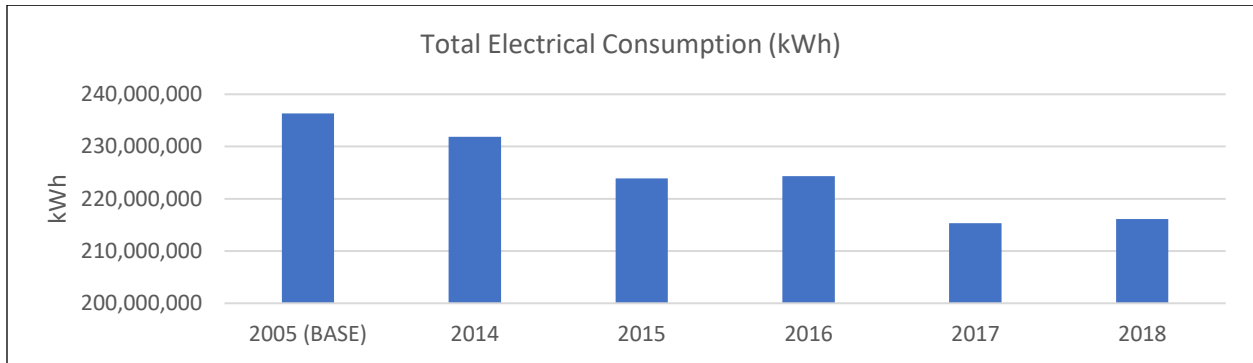


Figure 15: Total Natural Gas Consumption Past 5 years and Base Year (2005) Comparison

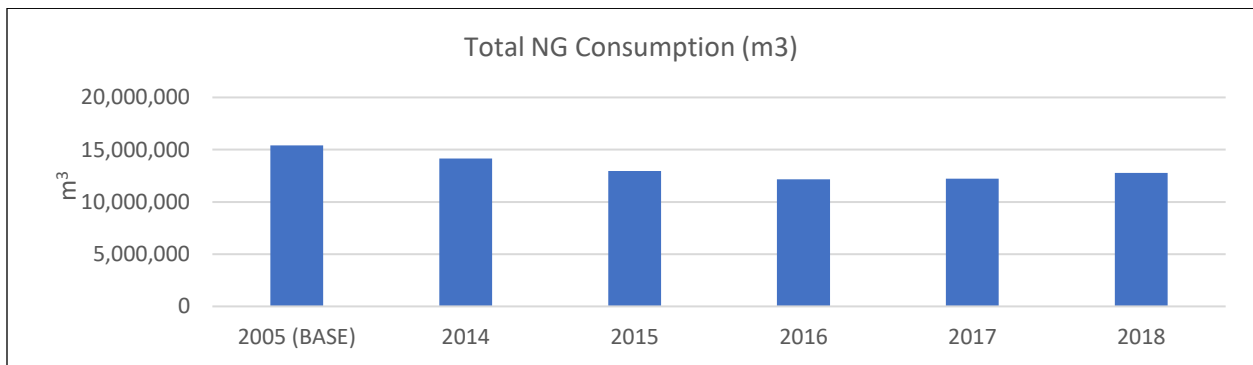
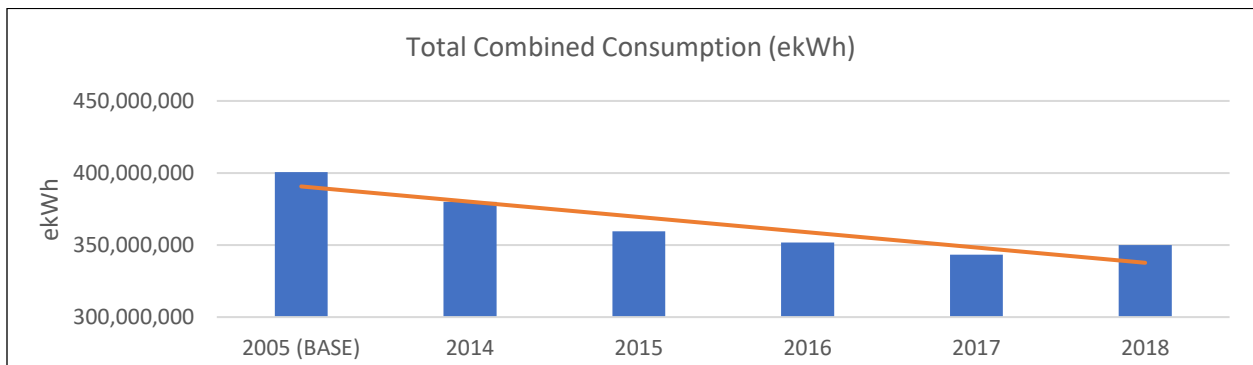


Figure 16: Total Combined Consumption Past 5 years and Base Year (2005) Comparison and Trend



The data below is reported usage by reporting sectors as determined by the City.

Figure 17: Total Combined Consumption Past 5 years and Base Year (2005) Comparison by Portfolio

Total Consumption (ekWh)	2005	2014	2015	2016	2017	2018
City/Town Halls	13,775,321	7,672,375	7,450,908	8,241,766	8,270,772	8,706,404
Corporate Facilities	17,187,713	10,999,712	9,567,546	8,146,697	6,393,977	9,404,499
O&M (includes Street & Traffic Lighting)	44,908,575	43,332,948	38,982,918	34,484,250	33,676,036	28,468,646
Water and Wastewater	121,039,542	135,206,297	128,918,793	122,872,891	124,460,848	126,764,430
Yards	39,589,214	29,972,676	27,323,163	28,068,361	25,103,818	28,503,129
Arenas	39,904,275	38,105,641	36,641,396	34,655,567	34,203,863	36,344,907
Community / Senior Centers	3,834,294	4,024,912	3,607,261	3,452,391	3,337,364	3,536,338
Rec Centres/Pools	26,789,266	29,098,173	28,200,437	27,221,121	26,985,952	25,130,292
Rec Parks/Stadiums/Golf	8,331,597	5,290,993	4,518,980	14,241,431	12,090,270	12,057,438
Lodges	24,937,533	16,739,300	16,443,992	16,096,965	15,672,434	15,113,101
Culture	5,382,733	5,027,160	4,776,888	4,642,701	4,727,958	4,931,697
Fire/ EMS	10,697,886	13,931,744	13,203,465	12,537,660	12,345,510	12,814,438
Libraries	9,343,443	10,830,397	10,806,036	10,559,425	10,479,246	11,211,349
Entertainment Venues	20,244,278	19,820,572	19,410,812	17,744,870	17,530,262	18,489,575
Police	14,756,585	9,830,119	9,607,750	8,688,230	8,066,778	8,573,378
Total Combined (ekWh)	400,722,256	379,883,020	359,460,344	351,654,327	343,345,087	350,049,621

City Facilities – Energy Intensity

Figure 18: Energy Intensity of Combined Electricity and Natural Gas Past 5 Years and Base Year Comparison and Trend

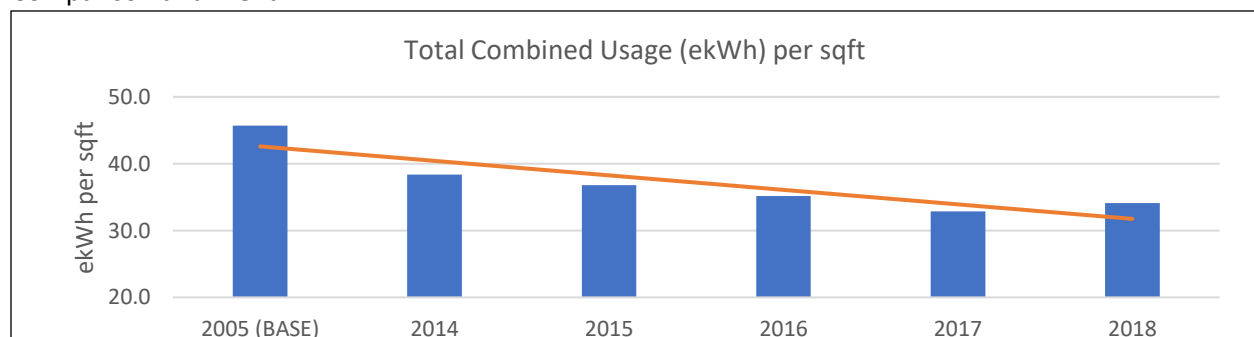


Figure 19: Energy Intensity of Combined Electricity and Natural Gas Past 5 Years and Base Year Comparison by Portfolio

Total ekWh per sqft	2005	2014	2015	2016	2017	2018
City/Town Halls	40	23	22	23	23	24
Corporate Facilities	45	22	20	17	21	22
O&M (includes Street & Traffic Lighting)	na	na	na	na	na	na
Water and Wastewater	na	na	na	na	na	na
Yards	38	36	33	34	26	30
Arenas	51	47	46	44	39	43
Community/Senior Centers	31	25	22	25	23	25
Rec Centres/ Pools	79	79	76	68	69	67
Rec Parks/Stadiums Golf Courses	37	48	41	33	26	25
Lodges	114	48	47	46	45	44
Culture	36	40	38	36	30	31
Fire/ EMS	45	42	40	37	36	37
Libraries	25	27	27	27	27	31
Entertainment Venues	30	30	29	27	26	28
Police	60	40	39	35	35	36
Total Usage (ekWh) per sqft	46	38	37	35	33	34

Vehicle Fleet

Figure 20: Past 5 Years Vehicle Usage

Fuel Type	Consumption Litres				
	2014	2015	2016	2017	2018
Diesel	12,030,732	11,993,691	11,067,857	9,404,408	9,172,662
Unleaded Gasoline	2,001,904	2,084,181	2,200,718	2,138,446	2,248,360
CNG (DLE)	1,074,377	1,225,216	2,616,192	4,195,759	5,104,215
Total	15,107,012	15,303,089	15,884,767	15,738,613	16,525,237

Figure 21: CAFE for Past 5 Years and Base Year (2012)

Diesel Litre Equivalent (DLE) per 100 KM	BASE (2012)	2014	2015	2016	2017	2018
Unleaded Gasoline	20.7	22.2	22.2	18.5	19.6	19.4
Diesel	54.5	54.2	55.2	52.5	55.8	54.1
CNG	66.2	67.9	67.8	58.9	68.0	70.7
Total	46.2	46.6	47.4	42.9	45.5	44.8

GHG Emissions – City Inventory

Figure 22: GHG Emissions Inventory for Past 5 years and Base Year Comparison and Trend

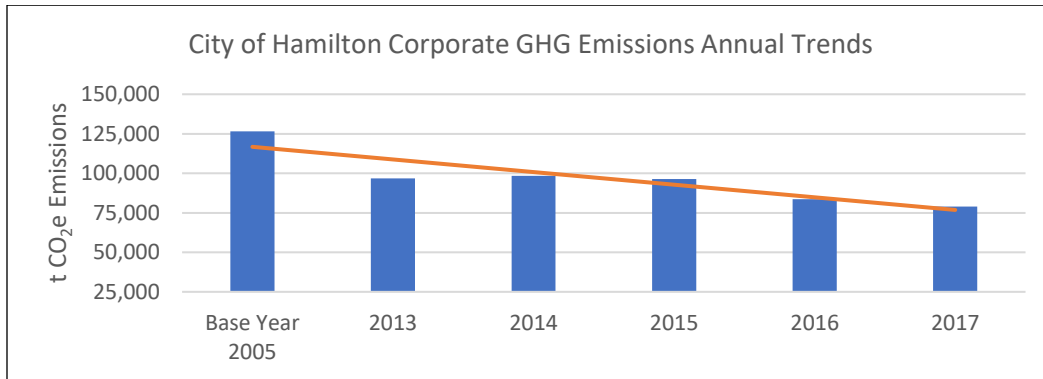
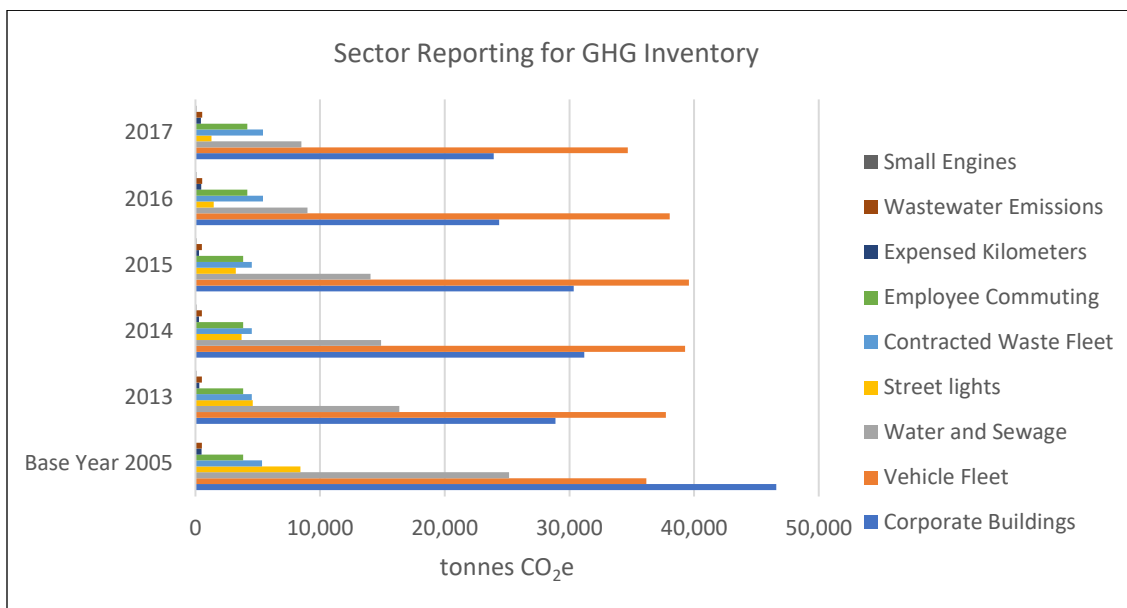


Figure 23: GHG Emissions Inventory for Past 5 years and Base Year Comparison by Portfolio Sector



4. PAST AND PRESENT INITIATIVES

4.1. Previous Conservation Measures and Initiatives

Conservation and Demand Management activities include efficiency upgrades to energy consuming systems. Typically, these tend to be a new energy efficiency technology or group of technologies are retrofit within a facility. These can also be included in capital renewal. The intent of the CEP is to make energy efficiency projects part of the City’s normal course of business. The benefits are to help achieve reductions in energy usage, energy intensity and GHG emissions to meet targets, and to improve operational efficiency, reduce maintenance costs and improve reliability. The CEP defines best practices

around the mitigation of energy consumption as it pertains to buildings and energy using systems and outlines specific policy actions around:

- Base Building Minimum Standards;
- Project Approval Processes;
- Incentives/Funding, Life Cycle Analysis;
- Sustainable Building;
- Energy Efficient Lighting;
- Building Automations Systems; Energy Efficient Equipment; and
- Monitoring and Verification.

Project teams work closely with consultants, engineers, utility personnel and industry experts to complete varying project types.

Figure 24: Past 5 Years Annual Usage Reduction (kWh) for Energy Conservation Projects

Project Type	Expected Annual kWh Reduction from Energy Projects ⁵				
	2014	2015	2016	2017	2018
LED Streetlighting Replacement	278,102	702,549	7,900,000		6,854,402
LED Interior Lighting Upgrades			1,856,882	2,287,999	999,305
LED Exterior Lighting Upgrades	62,615		1,136,364	41,959	80,640
Heating/Cooling Upgrades	348,386			159,452	47,235
BAS System Upgrades			62,632	30,844	-
Other			277,590	939,334	149,895
Total	689,103	702,549	11,233,468	3,459,588	8,131,477

4.2. Current Conservation Measures and Initiatives (2018)

Energy efficiency projects are ongoing and continue to be a part of the CDM Plan for the future. The projects completed for 2018 are shown below, as well as those targeted for 2019.

2018 Completed Energy Efficiency Projects:

- Anti-Stagnation Valves (Hamilton Water).
- Various Aquatic Centres – exterior LED lighting upgrades.
- Rosedale Tennis Dome – LED lighting upgrades.

⁵ Data shown is for annual expected kWh reduction. Amounts reported in Annual Report project totals may not include full value in the completion year, as reduction depends on completion date. Multi-year projects are shown in completion year.

- Fire Stations – interior LED lighting upgrades.
- Macassa Lodge – chillers upgrade (life cycle replacement).
- Lighting Asset Modernization Project (LAMP) – multi-phased LED street lighting installation.

2019 Targeted Energy Efficiency Projects:

- Various Ice Arenas - Refrigeration and controls upgrades.
- Valley Park Aquatic Centre - Interior LED lighting upgrades.
- Norman Pinky Lewis Recreation Centre – Solar wall installation.
- Macassa Lodge – BAS upgrade.
- Wentworth Lodge – HVAC and BAS upgrades.
- Lister Block – Interior LED lighting upgrades.
- Traffic Operations Centre – Interior and exterior LED lighting upgrades.
- Wentworth Street Operations Centre – Interior (office space only) LED lighting upgrades.

5. THE PLAN

5.1. Future Opportunities (2019-2023)

There are four focus areas for the CDM Plan for 2019-2023.

1. Energy Efficiency Projects
2. Policy Updates
3. Corporate Education, Awareness and Response
4. Community Energy Plan and Engagement

1. Energy Efficiency Projects

Energy usage reduction continues to be a key business case for implementing energy efficiency projects, but that is not the only litmus test for projects. The City recently declared a Climate Change Emergency, and as such the City may also consider reduction of GHG emissions as a priority focus for tackling climate change. An effort will be made to look at project proposals with the additional or primary benefit of GHG reductions. The existing CEP identifies several factors to guide decision-making, including energy usage reductions, life-cycle analysis, funding and reduced emissions.

Figure 25: Proposed Projects Identifying GHG Emissions Reduction Focus

Project Name	Location	Department/ Division ⁶	Project Type	Estimated Project Cost	Estimated GHG Reductions (Tonnes)
Wentworth Ops Boiler Retrofit	Wentworth St. Operations Centre	PW/EFFM	Mechanical Upgrade	\$137,500	116.62
Wentworth Ops Solar Wall	Wentworth St. Operations Centre	PW/EFFM	Passive Solar	\$507,529	279.96
MTC Solar Wall	Mountain Transit Centre	PW/EFFM	Passive Solar	\$1,771,550	484.30
First Ontario Centre Lighting Retrofit	First Ontario Centre	PW/EFFM	General Lighting	\$216,000	31.48
Central Public Library Mechanical Retrofit	Central Public Library	Library Board	Mechanical Upgrade	\$330,000	28.49
Battery Electric Buses	Transit	PW/Transit	Transit	\$10,000,000	700.00
Westdale & Terryberry Library Rooftop Unit Replacement	Westdale & Terryberry Libraries	PW/EFFM	Mechanical Upgrade	\$108,000	6.88
Library Branches Lighting Retrofit - Excluding Central Public Library	Library Branches	Library Board	General Lighting	\$189,000	11.65
Central Public Library Lighting Retrofit	Central Public Library	Library Board	General Lighting	\$161,843	8.34
Stoney Creek City Hall Lighting Retrofit	Stoney Creek City Hall	PW/EFFM	General Lighting	\$196,107	8.63
Yards Lighting Retrofit	Various Yards Across the City	PW/EFFM	General Lighting	\$550,000	24.08
Hamilton City Hall Lighting Upgrade	Hamilton City Hall	PW/EFFM	General Lighting	\$270,000	11.03
Various Community Centres Lighting Retrofits	Community Centres/Outdoor Pools/Seniors	PW/EFFM	General Lighting	\$432,000	17.20
Solar PV / Net Metering	Morgan Firestone & Harry Howell Arena	PW/EFFM	Renewables	\$900,000	20.64
Parkdale Arena Refrigeration Plant Retrofit	Parkdale Arena	PW/EFFM	Mechanical Upgrade	\$795,000	6.77
Eastwood Arena Refrigeration Plant Retrofit	Eastwood Arena	PW/EFFM	Mechanical Upgrade	\$795,000	0.87
Pool Water Solar & Heat Recovery Project	Facilities and Rec to confirm ideal location	PW/EFFM	Passive Solar	\$302,100	50.00

⁶ PW refers to Public Works; EFFM refers to Energy, Fleet and Facilities Management; Transit refers to HSR Transit; Library Board refers to Hamilton Public Library Board.

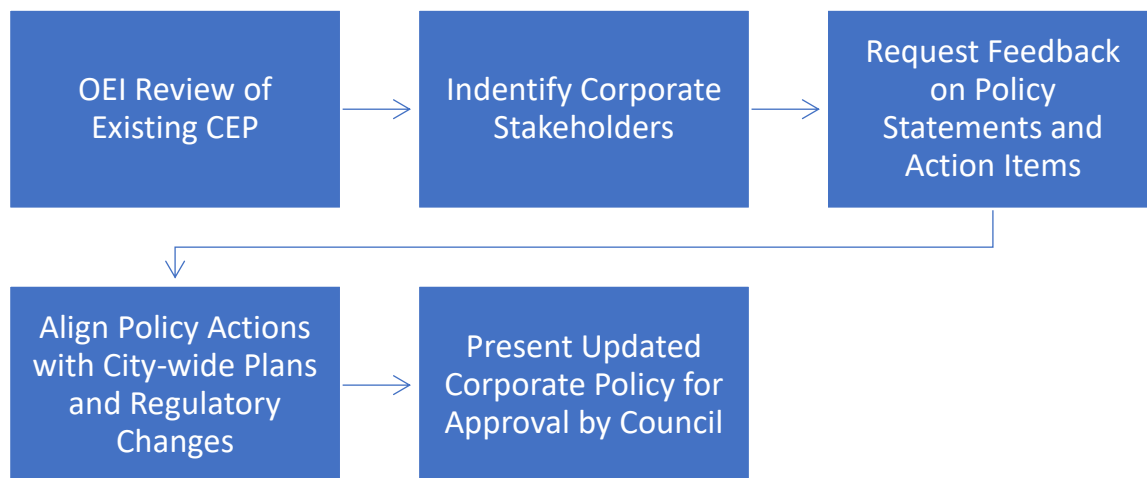
2. Policy Updates

The CEP is currently undergoing a five-year review. The intent of the review is to adjust and better align the current policies to changes occurring in the regulatory environment and to City-wide plans currently in place. The Policy will continue to support energy-related initiatives and improvements that lead to further reductions in energy use and GHG emissions.

During the review, feedback from corporate stakeholders will allow for improvements in policy and policy actions on streamlining processes and updating minimum standards for building envelop, building operations and commissioning, and services as they pertain to energy and environment for corporate assets. Policies related to vehicle fleet, green vehicles and water operations will also be reviewed and updated.

The targets for corporate energy intensity reductions and for corporate emissions reductions will remain in place. The policy review will look at how updates to policy actions can improve the likelihood of reaching the long-term targets and move towards incorporating other City-wide plans. A target date is completion and presentation to council by Q1 2020.

Figure 26: Corporate Energy Policy Review



3. Corporate Education, Awareness & Response

Education, engagement and feedback on both energy reduction and emissions efforts from staff is required to continuously improve on and meet the targets the City has in place.

In 2018, a series of presentations was made to senior leadership teams in both Public Works and broader Corporate leadership to highlight the energy usage and energy intensity reductions efforts over the past 10 years. This included reviewing varying key performance indicators used to measure success. Although buy-in is required at senior levels, success is contingent on all staff. A communication strategy designed to seek feedback from front-line staff in several key areas around building retrofitting,

maintenance, conditioning as well as fleet vehicle efficiency, green fleets and fuel reduction strategies is being developed as part of the 2019 review of the Corporate Energy Policy.

In early 2019, City council declared a climate change emergency. One of the focus areas for the City will be in response to this declaration. To guide the creation of a multi-departmental corporate climate change task force and identify several issues associated with the climate change risks for the City as a whole, the development of a strategy document is being drafted. The expectation is that the strategy document will be complete in 2019, and should address:

- Task force mandates;
- Timelines;
- Membership; and
- Centralized reporting.

4. Community Energy Plan & Engagement

To encompass the broader City view regarding energy, water and emissions reductions initiatives, environmental stewardship and climate change actions, the development of a Community Energy Plan is commencing in 2019.

Under the direction of Planning and Economic Development, the community plan is intended to help guide Hamilton toward the creation of a sustainable, healthy and reliable future as it relates to energy and the environment. The development of the plan will engage a variety of City staff, community stakeholders, agencies and the public on community energy issues via an engagement and communications plan.

The Community Energy Plan objectives are to identify opportunities for energy and water conservation, generation, renewable energy, and cleaner and energy efficient transportation throughout the City. Furthermore, the plan will help develop actionable items for economically viable and environmentally sustainable energy solutions, develop community priorities for energy infrastructure and help identify appropriate planning policies to support sustainable growth in Hamilton.

The Community Energy Plan is expected to be completed by the end of 2020.

As mentioned in section 2.1, the City holds membership in several community-led or regional organizations with a focus on climate action. One is the Bay Area Climate Change Action Council, which brings a collaborative regional approach to accelerating climate action. With the City's declaration of a climate emergency, the City is urged to participate and in its implementation teams to accelerate climate action with the communities of Hamilton and Burlington.

5.2. Renewable Energy

Existing renewable generation operations for the City are managed through Hamilton Renewable Power Inc. (HRPI). HRPI owns and operates three 1.6 MW renewable gas fueled units. Two of the units are located at the Glanbrook landfill site. The third unit, a cogeneration unit, producing electricity and heat, is located at the Hamilton Water site at Woodward Avenue.

The three units use raw biogas as a renewable fuel sources to produce electricity for the power grid through a long-term contract with the province. Using renewable fuel contributes to a more efficient and sustainable process, and further offsets GHG emissions. The systems produce 28,000,000 kWh of renewable energy annually, with a reduction of 100,000 tonnes CO₂e. In 2018 the net benefit from all HRPI operations was approximately \$1.1 million, with a cumulative total of \$17.5 million from 2006.

Renewable natural gas is also produced at Woodward Avenue using a Biogas Purification Unit (BPU). The BPU captures excess methane gas from the anaerobic digestion process of the waste water process. The raw biogas is purified, treated and conditioned to yield the utility grade renewable natural gas that can be injected into Union Gas distribution system.

The City currently leases roof space to Alectra Utilities for a rooftop solar PV installation, with a further two projects in development.

Plans for renewable energy expansion over the next five years include exploring:

- Renewable energy from organics;
- Additional solar PV roof installations; and
- Solar thermal.

6. CONCLUSION

The City of Hamilton manages its corporate energy portfolio with a focus on meeting its targets in energy intensity, reducing GHG emissions and improving the efficiency of fleet vehicles. The development of this CDM plan represents the continued commitment to achieving these goals by implementing energy efficiency or GHG-reducing projects, updating policies to better align corporate activities to targets, and increasing engagement corporately and with the community.