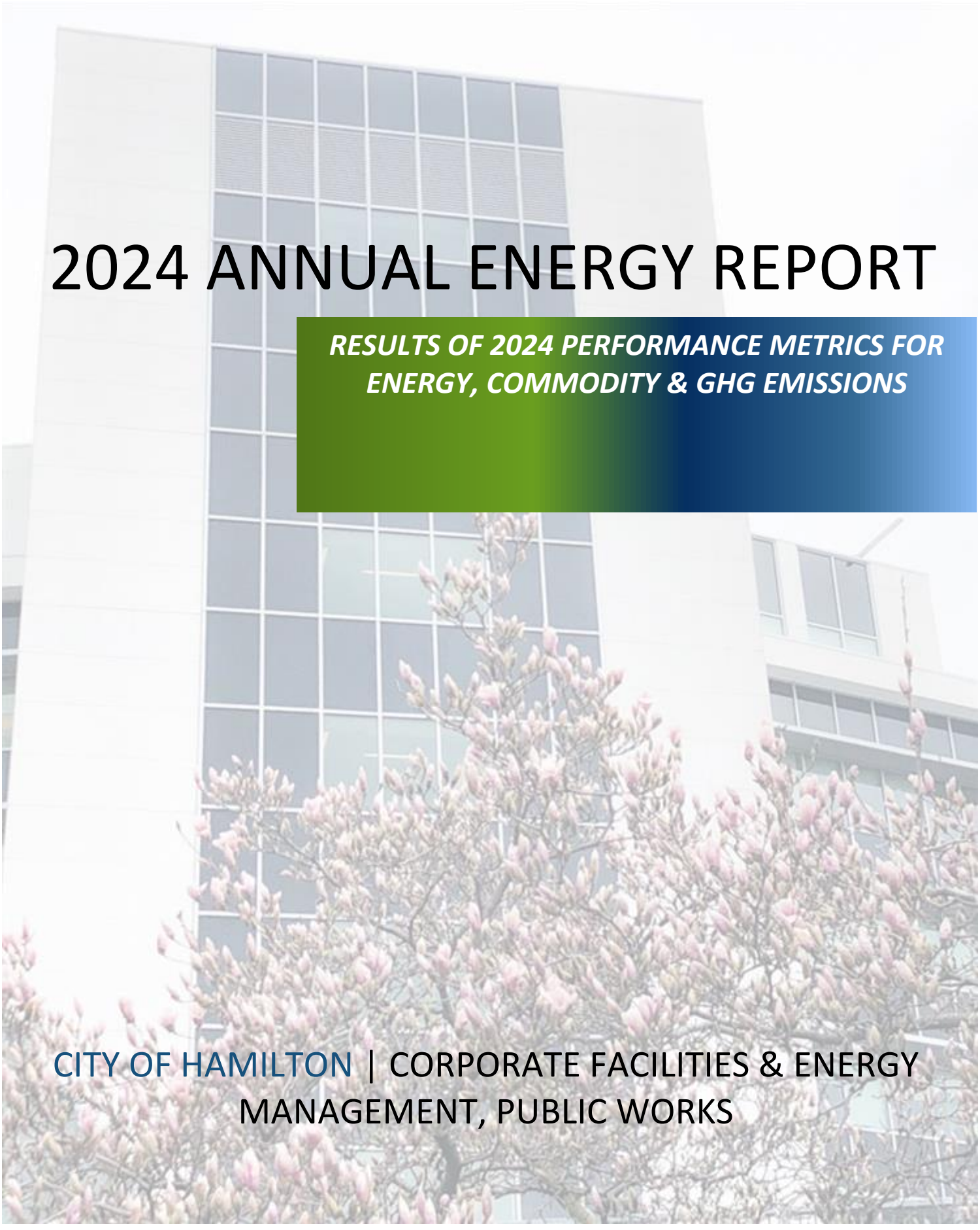

2024 ANNUAL ENERGY REPORT

RESULTS OF 2024 PERFORMANCE METRICS FOR ENERGY, COMMODITY & GHG EMISSIONS

CITY OF HAMILTON | CORPORATE FACILITIES & ENERGY MANAGEMENT, PUBLIC WORKS

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EXECUTIVE SUMMARY

28% of Energy Intensity Reduction from 2005

1% Increase in Utility Costs (Electricity, Natural Gas and Fuels) over 2023

32% GHG Emissions inventory Reduction from 2005

The City of Hamilton has been reporting on its annual energy data and related energy reductions, conservation activities and emissions data for a number of years. Energy reduction considerations, climate change and climate action has been embedded in many of the decisions made by the City. Reducing energy use and emissions has been the catalyst for the City's Pathway to Net Zero activities and resulting conservation and generation projects. The City of Hamilton 2024 Annual Energy Report presents results in three main sections.

PART 1: Annual Energy Performance Results

The City continually tracks and reports on a variety of the key performance indicators (KPI) to measure the City's successes and identify areas for improvement. These metrics have been instrumental in the evaluation of results from decisions made or strategies developed to meet different City goals and targets. Although costs may be impacted by many outside factors, cost reduction and the avoidance of costs are a result of specific energy-related strategies and programs implemented by the City. Additional metrics reported are related to usage of electricity, natural gas, fuels and energy intensity, which demonstrate year over year changes.

PART 2: Corporate Report on Commodity Hedging and Rate Optimization

As outlined in the Corporate Energy and Sustainability Policy (PW14050(a)), details related to energy commodity hedging agreements, other utility and commodity contracts and results of various activities are to be reported annually. This area of the report provides the results on commodity hedging, utility rate optimization and related comparisons to set benchmarks.

PART 3: Corporate Greenhouse Gas (GHG) Emissions Report Inventory

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 and the Board of Health Climate Change Actions 2012 report (BOH13024). The original targets were a 50% reduction by 2030 and an 80% reduction in GHG emissions by 2050, but in 2020 the long-term target was updated to net zero emissions by 2050 when compared to the base year 2005.

Additional charts and graphs for all parts shown in Appendix A of this report.

CORPORATE POLICY

CORPORATE ENERGY AND SUSTAINABILITY POLICY

One of the tools used to guide decision making around energy use reduction, sustainability, emissions and reporting for corporate assets and operations is the Corporate Energy and Sustainability Policy[1]. The policy was revised in 2020 and was accepted by Council in February 2021. The Policy re-iterates the importance of considering energy and sustainability decisions in capital planning, and to align it with other City-wide initiatives such as addressing climate change, renewable energy and Fleet and Transit policies.

The targets in the 2020 policy include:

Table 1: Current Active Corporate Energy and Sustainability Targets

Year	Energy Intensity Reduction Targets	Emissions Reduction Targets
2030	45%	50%
2050	60%	100%*

*Net zero emissions

The policy document is reviewed every five years to ensure that it remains relevant to the existing regulatory environment and to other City-endorsed policies or initiatives on energy reduction and sustainability. The next policy iteration will be presented later in 2025.

In August 2024, the City also released its five year Conservation Demand Management Plan[2] as per O.Reg 25/23 that highlight the key areas of focus for next five years to continue moving corporate facilities toward its targets. These actions include energy generation, conservation and GHG mitigation.

[1] Corporate Energy & Sustainability Policy is available: https://www.hamilton.ca/home-neighbourhood/environmental-stewardship/environmental-plans-strategies/office-energy

[2] City of Hamilton Conservation and Demand Management Plan is available: https://www.hamilton.ca/home-neighbourhood/environmental-stewardship/environmental-plans-strategies/office-energy

PART 1 ANNUAL ENERGY PERFORMANCE RESULTS

Conservation & Incentives

Projects ***$4.3M***

Incentives ***$26K***

Commodity & Rate Strategies

Hedging strategies
$1.4M

Global Adjustment and Rate Changes
$4.8M

Cost Recovery

Billing Errors
$335K

Fuel Credit Recovery
$134K

ENERGY PERFORMANCE- SAVINGS & AVOIDED COSTS

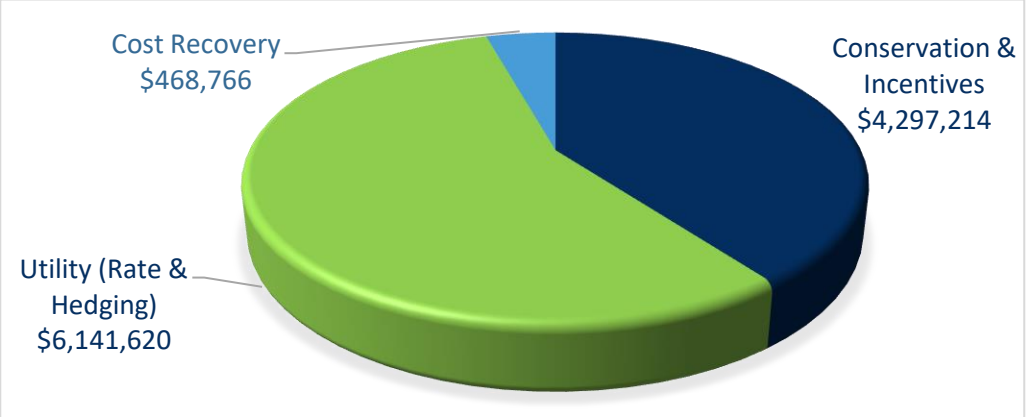
The Annual Energy Report provides data for the City's corporate energy and fleet usage, utilities and fuel costs, energy intensity results, conservation, and a variety of other key performance indicators (KPIs). These KPIs include savings and avoided costs for different energy and cost reduction programs, strategies, and benchmarks. There are three categories that comprise savings and avoided costs:

Energy Conservation and Incentives which reports the results of the savings achieved from implementing energy efficiency measures, equipment and processes within the City's building assets that lead to reductions in energy consumption as well as financial incentives received for completing those projects.

Utility Rates & Commodity Strategies reports the results of the electricity and natural gas costs that would have been incurred by the City had no action been initiated to reduce costs. Actions include procurement strategies, natural gas hedging strategies and optimizing utility rates including switching rate class to increase benefits from Global Adjustment (GA) savings opportunities.

Cost Recovery reports on the results of costs recovered due to the City's continuous efforts to review its utility accounts to correct any billing errors. It also includes recovery related to credits from utility or commodity programs and fuel tax recovery programs.

Chart 1: 2024 Breakdown of Cumulative Savings and Avoided Costs



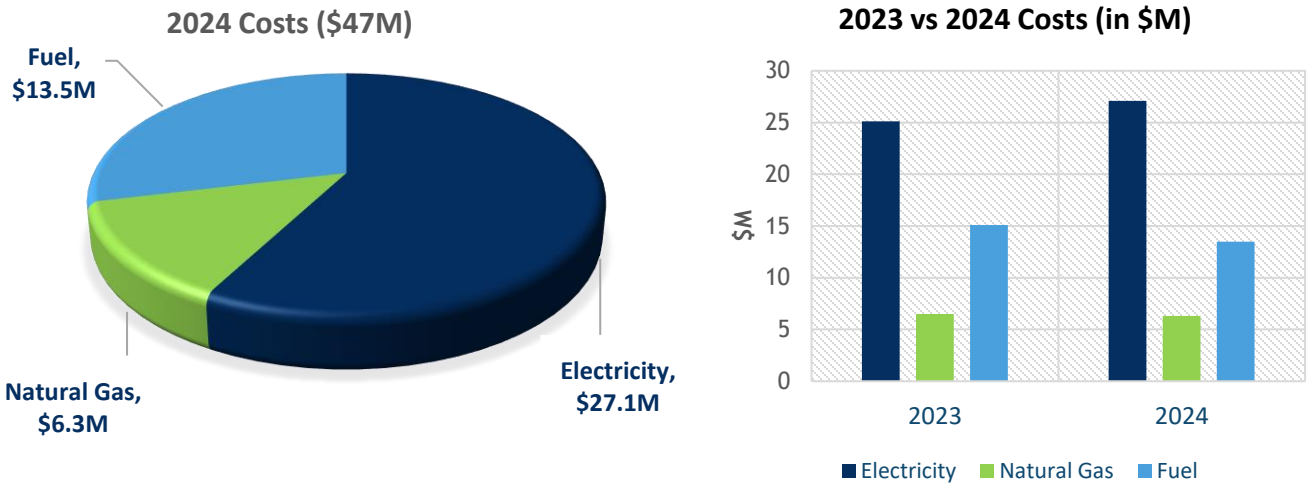
2024 ENERGY PERFORMANCE & RESULTS

OVERALL UTILITY COSTS

Energy costs are a significant operating budget item for corporate buildings and vehicle assets. Although cost mitigation actions from energy efficiency projects that reduce consumption can have a positive impact on costs, costs themselves are impacted by much more than usage. Regulatory changes, rate changes, inflation, global markets and weather can all impact costs despite reductions in usage. Costs for energy include regulated charges and market-based (commodity) charges.

Costs determined in this report are incurred by City-owned and operated buildings/sites and exclude City Housing Hamilton. Utilities include Alectra Utilities, Hydro One Utilities and Enbridge Gas Inc. Sites linked to the district energy system with utility costs provided from HCE are included in electricity and natural gas respectively. Fuels include diesel, unleaded gasoline and compressed natural gas (CNG) for all Transit and Fleet operations (excluding Hamilton Police Services or DARTS).

Chart 2: (a) Total Overall Annual Utilities Costs 2024. (b) Compared to 2023



Sites with partial data may be excluded. The inclusion of buildings/sites in the report may vary from year to year. In any given reporting period, buildings and vehicles could be added (built or purchased) or removed (sales or demolitions). Major renovations may decommission a site for a time and may be excluded as a full year data set may not be available. As such, square footage is adjusted annually to include only reported sites.

ELECTRICITY CONSUMPTION AND COSTS

Electricity consumption in 2024 was up 1% from 2023 and down 12% from the base year of 2005. The costs and unit price also rose in 2024, by 8% and 7% respectively when compared to the previous year.

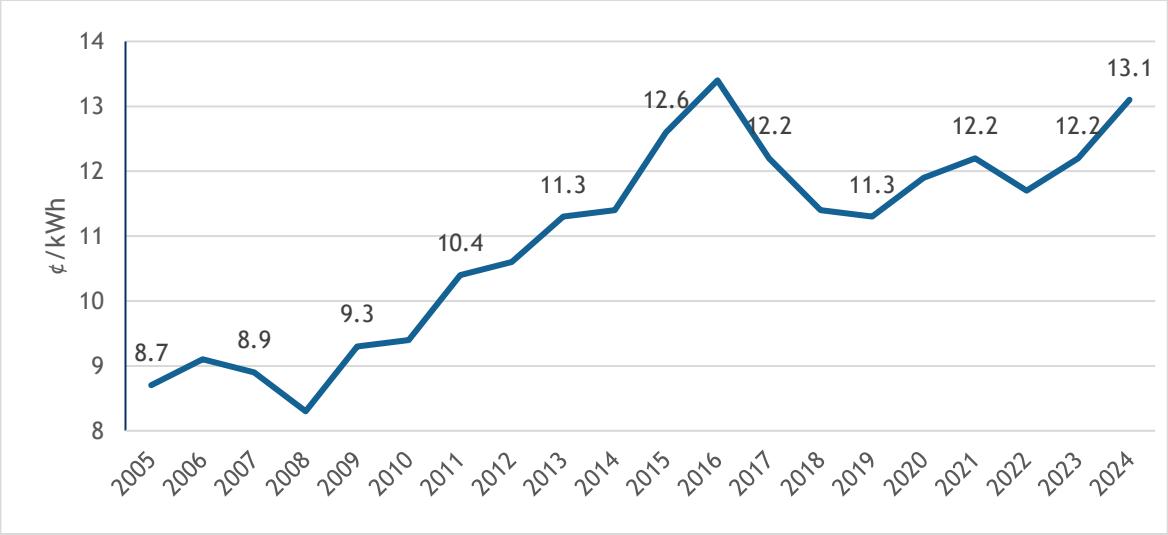
Costs for electricity comprises commodity, delivery, transmission, and other regulatory charges. Commodity includes the Hourly Ontario Energy Price (HOEP) and the Global Adjustment (GA). Both portions of the commodity are determined by market-based factors and are administered by Ontario's Independent Electricity System Operator (IESO). The other charges, delivery, transmission and regulatory are regulated by the Ontario Energy Board (OEB), and any requests by a local utility (also called a local distribution company), to change such rates requires OEB approval. The City of Hamilton operates within two local distribution companies, Alectra Utilities and Hydro One.

Table 2: 2024 Electricity Consumption, Costs and Comparison

	2005	2023	2024	2024 vs 2005	2024 vs 2023
Total Electricity kWh	236,362,045	205,217,111	206,896,802	-12%	1%
Total Electricity Cost $	$20,657,050	$25,132,616	$27,102,462	31%	8%
Total Electricity $/kWh	$0.087	$0.122	$0.131	50%	7%

There was 41% more cooling degree days in 2024 versus 2023, which is a contributing factor in the electricity usage, as demand increased during the summer for cooling.

Chart 3: City of Hamilton Annual Average Electricity Price *2005-2024* (¢/kWh)



Provincial electricity costs increased, both in the market and in the regulated rates, pulling City costs up by 8% year-over-year despite a 1% increase in consumption. Regulated rates rose by 19% relative to 2023, while the hourly market increased by 13%, contributing to a net 7% increase in the unit price of electricity.

NATURAL GAS CONSUMPTION AND COSTS

Natural gas results for 2024 are shown in the table below. Natural gas consumption for buildings in 2024 was a 2% decrease from 2023 and an increase of 1% compared to the base year of 2005. Natural gas consumption declined despite a 4% year-over-year increase in heating degree days, reflecting efficiency projects to reduce natural gas consumption and associated emissions.

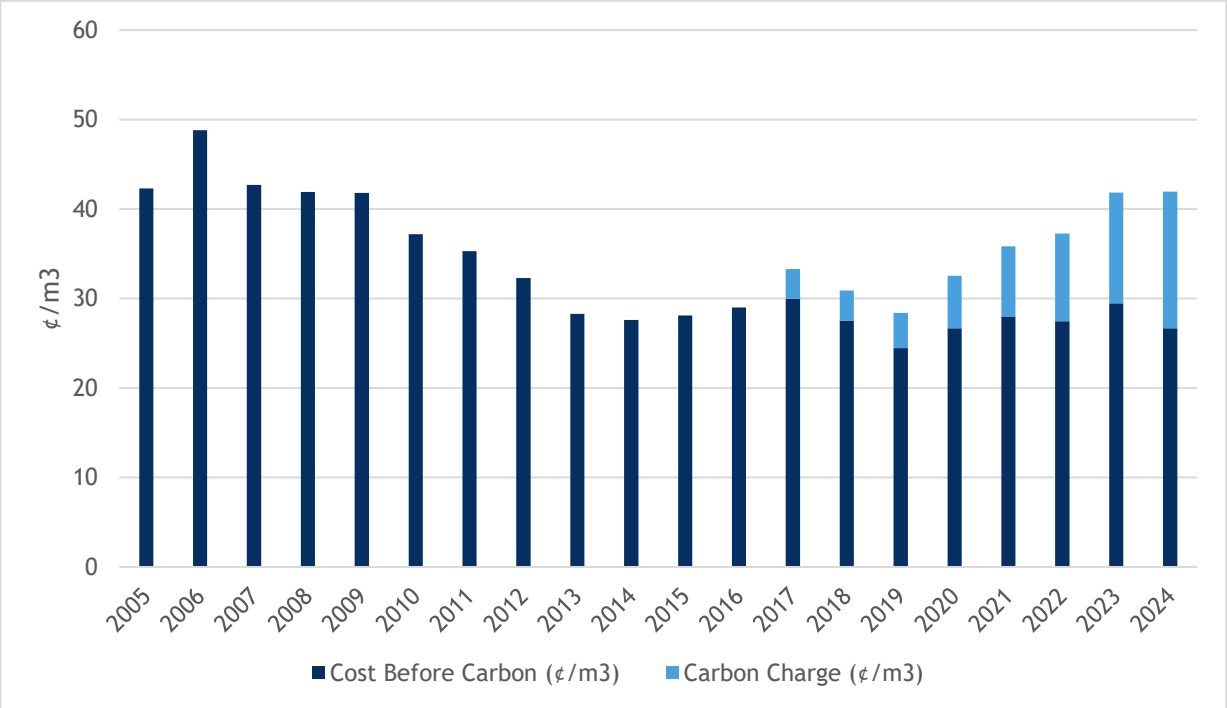
The year over year cost decreased in by 2% and the unit price remained static despite the increase to certain components, such as the federal carbon charge.

Costs for natural gas include the commodity charges, which the City purchases on the wholesale market via purchasing agreements, and distribution and transportation charges, which are provided by Enbridge Gas. The gas is delivered to the end user by Enbridge Gas regardless of where the commodity is purchased. The decline in natural gas costs coincided with a reduction in hedged and variable commodity charges. A detailed breakdown of the City's natural gas commodity purchases is covered later in this report under Natural Gas Hedging.

Table 3: 2024 Natural Gas Consumption, Costs and Comparisons

	2005	2023	2024	2024 vs 2005	2024 vs 2023
Total Natural Gas m3	15,403,956	15,868,796	15,475,041	1%	-2%
Total Natural Gas Cost $	$6,520,253	$6,492,806	$6,340,637	-3%	-2%
Total Natural Gas $/m3	$0.423	$0.409	$0.410	-3%	0%

Chart 4: City of Hamilton Annual Average Natural Gas Cost – All in (¢/m3)



COMBINED CONSUMPTION AND COSTS (ELECTRICITY & NATURAL GAS)

The combined consumption of electricity and natural gas converted to equivalent kilo-watt hours (ekWh) represents a 1% decrease compared to 2023. However, costs are also 6% higher for that period.

Table 4: Combined Energy Consumption, Costs and Comparisons (in 000's)[3]

	2005	2023	2024	2024 vs 2005	2024 vs 2023
Total Combined Energy (ekWh)	400,722	369,617	367,218	-8%	-1%
Total Energy Cost $	$27,177	$31,625	$33,443	23%	6%
Total Energy $/ekWh	$0.068	$0.086	$0.091	34%	6%

ENERGY INTENSITY

Energy intensity is one of the key metrics used across the industry as a measure of energy consumption in facilities and for the City, and it measures usage in equivalent kilowatt hours per square foot (ekWh/sqft) of operated space. Each year, the City reviews the electrical and natural gas usage and updates the square footage of occupied space to reflect changes in building portfolios. The forward targets outlined in the Corporate Energy and Sustainability Policy are a reduction in energy intensity of 45% by 2030 and 60% by 2050 as compared to the base year of 2005.

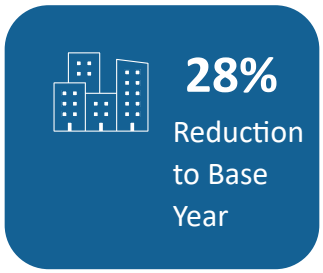


Table 5: 2024 Energy Intensity Comparison by Portfolio

	2005	2023	2024	2024 vs 2005	2024 vs 2023
City Total (ekWh/sqft)	45.69	32.40	32.67	-28%	1%
City Total ($/sqft)	$2.67	$2.63	$2.70	1%	3%
Reported Square Footage	5,138,852	5,403,803	5,361,824		

[3] Combined usage is electricity in kWh plus natural gas in m3 converted to ekWh.

VEHICLE FUELS

- *Diesel usage **down 26%***
- *Gasoline usage **down 1%***
- *This corresponds with an **increase** of **35%** in CNG consumption.*

*The Cost Benefit of CNG is an **avoided cost of $8.9 million** compared to using only Diesel buses.*

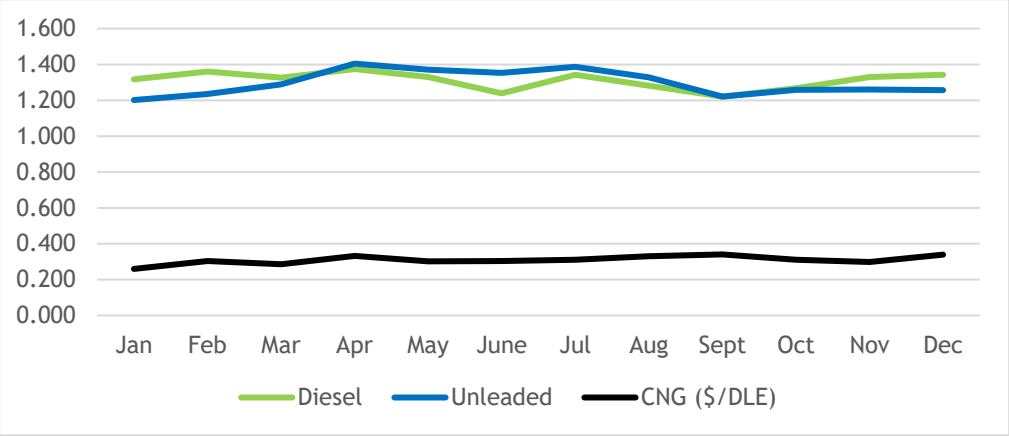
FUELS CONSUMPTION AND COSTS

Fuel for the City's fleet of vehicles is purchased on the wholesale market for all of the City's own fleet vehicles, including, but not limited to heavy vehicles for Roads, Waste, Hamilton Water, Fire and EMS and Transit, as well as smaller departmental vehicles, like small trucks and SUVs for Building and Bylaw. Fuels include diesel, unleaded gasoline and compressed natural gas (CNG).

Table 6: 2024 Fuel Consumption and Costs

Fuel Type	Litres Used	Cost	Average $/L	Usage 2024 vs 2023	Average Price 2024 vs 2023
Diesel	4,630,540	$6,223,295	$1.34	-26%	-5%
Unleaded Gasoline	2,516,904	$3,357,225	$1.33	-1%	0%
CNG (DLE)	12,797,852	$3,967,777	$0.31	35%	3%
Total	19,945,297	$13,548,298	$0.68	9%	-17%

Chart 5: 2024 Fuel Cost Comparison ($/DLE)

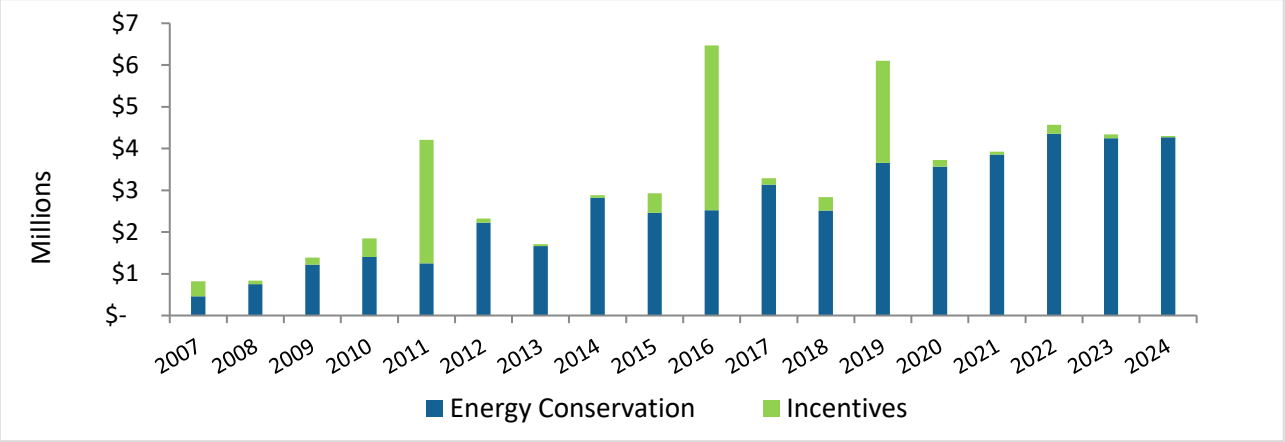


When converted to diesel equivalent dollars and adjusted for efficiency, Transit avoided spending $8.9M with their fleet of CNG buses than they would have if using only diesel buses. In addition, the lower GHG emissions from using CNG fuel versus diesel is of benefit to the City overall and positively impacts the City's corporate GHG emissions inventory.

CONSERVATION INITIATIVES

Conservation project activities play a key role in reducing energy usage, improving efficiencies, and reducing long term operational costs. The 2024 savings from projects was $4.3M and the City received $25,827 in incentives from various programs.

Chart 6: Energy Conservation Project Savings and Incentives



Below are a sample of some related projects that will result in ongoing energy efficiency and savings.

PUBLIC FACILITIES EFFICIENCY PROJECTS

Bennetto Recreation Centre – Heat Reclaim & Controls Project

- Installation of a pool water, waste heat recovery system, efficient make-up water controls and low flow shower heads.
- Annual reductions of 14,689 kWh electrical, 10,591 m3 natural gas, 2,048 m3 water 20.8 tCO_2e. Overall operational savings are estimated at $ 13,159 annually.

Jimmy Thompson Pool: Pool Filter Pumps VFD installation Project

- Installation of a variable frequency drive (VFD) on the existing pool filter pump.
- Annual reductions of 10,712 kWh electrical, 1.0 tCO_2e. Overall operational savings are estimated at $ 1,392 annually.

Kanétskare Recreation Centre: Heat Reclaim/Controls & Heating Pump/HVAC VFD Project

- Installation of a pool water, waste heat recovery system, efficient make-up water controls and installation of a variable frequency drive (VFD) on supply fan SF-4 and heating distribution pump.
- Annual savings of 12,570 kWh electrical, 5,484 m3 natural gas, 1,263 m3 water, 12.1 tCO_2e. Overall operational savings are estimated at $8,652 annually.

EV CHARGING PROJECTS

The City's priorities include electrification of City assets. The installations of EV charges for Fleet-owned vehicles is helping reduce the GHG emissions and is part of the City's pathway to NetZero strategies and City's Green Fleet Strategy.
Along with the EV chargers (see details below), the City plans to add approximately 115 charging stations between 2025 and 2028 at a number of facilities across the City to further support the electrification of the City's fleet. Installation of EV chargers include collaboration between fleet staff and facilities staff to ensure infrastructure is able to support the additional electrical loads.

City Hall

- This project included the installation of nine (9) dual level 2 chargers for City's fleet vehicles.
- Helps reduce the GHG emissions & maintenance costs by taking City's gasoline vehicles off the road.
- Annual Estimated GHG emissions reduction of 18 tCO_2e and 7,821 Liters of gasoline.

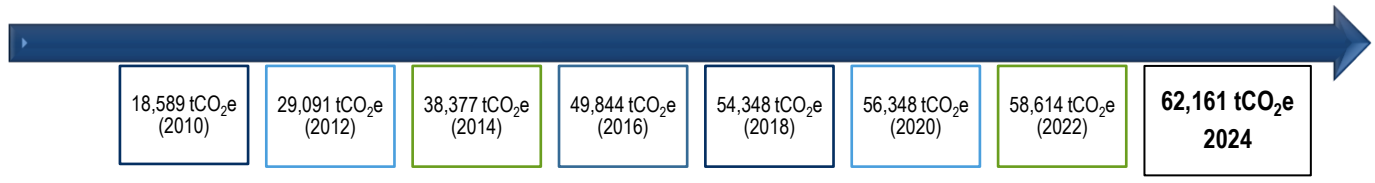
Yards, Corporate buildings, and Arenas

- This project included the installation of twenty-four (24) dual level 2 and one (1) level 3 chargers at various City locations for fleet vehicles.
- Helps reduce the GHG emissions & maintenance costs by taking City's gasoline vehicles off the road.
- Annual Estimated GHG emissions reduction of 67.5 tCO_2e and 29,526 Liters of gasoline

EMISSIONS REDUCTIONS FROM PROJECTS

One of the major benefits of completing energy efficiency or climate change prioritization projects is the reductions in GHG emissions that would have otherwise been emitted into the atmosphere. For 2024, project activity (including those completed in prior years with annual reductions) resulted in 2219 tCO_2e emissions reduction.

Chart 7: Cumulative GHG Savings from Project Activities



PATHWAY TO NET ZERO INITIATIVES

There is no one clear route to achieving net zero emissions. It requires a broad combination of various projects and programs, operational changes, renewable energy generation and electrification. To facilitate all that must be accomplished, a forward-looking plan or “pathway” is required. The City has developed site-specific Pathway to Net-Zero (PNZ) plans for a variety of facilities, with initial focus on the highest-emitting portfolios. 17 plans have already been completed, and a further 8 commenced in 2024 and will be completed early 2025.

Going forward, the City plans to add five to ten site-specific PNZ plans per year, prioritized by emissions’ impact and alignment with existing projects, operational and life cycle asset plans.

8 PNZ Plans underway in the following:

- Yards
- Municipal Centres
- Libraries and Community Centres

RENEWABLE ENERGY INITIATIVES

Pathway to Net Zero initiatives identify various actions to move the City forward to reach targets of net zero emissions by 2050 and renewable energy will need to play a key role in achieving those targets. A variety of feasibility studies are underway to propose the best way forward in utilizing the City’s existing renewable assets through expansion of generation capacity as well as implementing additional renewable energy options.

Currently The City’s biogas renewable generation operations are owned and managed through Hamilton Renewable Power Inc. (HRP Inc.). There are three 1.6 MW biogas-fueled systems. The three units use raw biogas as a renewable fuel source to produce electricity for the power grid through a long-term contract with the province.

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 in the wastewater process. The raw biogas is purified, treated, and conditioned to yield the utility grade renewable natural gas that can be injected into Enbridge Gas distribution system.

The City of Hamilton currently has two facilities with solar generation arrays. Hamilton Public Library installed a 30-kW rooftop solar PV on the Valley Park Library and Community Centre as part of its LEED Gold certification. The City also leases roof space to Alectra Utilities for a 250-kW rooftop solar PV installation at the Wentworth Operations Centre. As the City explores solar options, construction on new City facilities include plans for solar-ready structures so that implementation of solar projects can be facilitated when the best options are available.

PART 2 COMMODITY HEDGING AND RATE INITIATIVES

*Natural Gas **Hedging** initiatives resulted in a benefit of **$1.4 Million***

*Global Adjustment & **Rate** Optimization resulted in a benefit of **$4.8 Million***

The information in this section details commodity hedging and rate optimization activities. The required Treasurer's Annual Statement on Commodity Price Hedging is attached as Appendix B to this report.

Hedging is a risk management strategy to reduce price volatility by entering into energy supply contracts direct with commodity suppliers to fix the price for specific volumes and terms in the future. Rate optimization ensures that the correct utility rate class is selected for each account to reduce utility-related commodity costs (e.g. global adjustment for Class A customers).

OVERALL RESULTS

The utility rates and commodity strategies the City participated in for 2024 include Global Adjustment (GA) rate changes and natural gas hedging programs

Table 7: 2024 Utility Rates and Commodity Strategies Results

2024 Results	$M	Levy	Rate
Global Adjustment & RPP	$4.8M	25%	75%
Natural Gas Hedging	$1.4M	78%	32%
Total	$6.1M	37%	63%

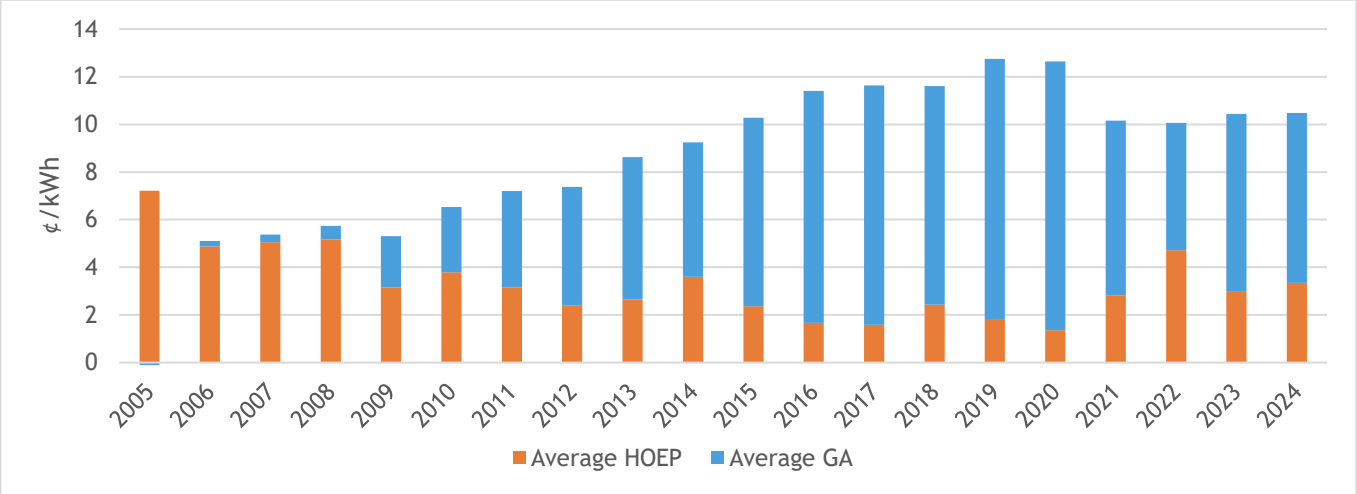
ELECTRICITY RATE OPTIMIZATION

The electricity market in Ontario itself is complex and volatile. The commodity portion of the electricity price is made up of the Hourly Ontario Electricity Price (HOEP) and the Global Adjustment (GA). Most of the GA costs are from contracts that the Independent Electricity System Operator (IESO) has with generators, many of which are fixed price or guaranteed revenue agreements.

When spot prices (HOEP) are lower, the generator does not earn enough revenue to meet its revenue guarantees. In that case, the IESO pays the generator to make up this difference and the costs are recovered from consumers through the GA. Therefore, in a month when the market price of electricity is low, the GA will be higher and conversely when market prices are high, the GA will be lower.

For billing of the GA costs, most commercial consumers are on a Class B rate. Class B consumers pay a regulated GA rate set monthly and posted by the IESO. There is no market mechanism to hedge against the regulated GA rate. In 2024, Class B customers paid a combined average of $0.1047/kWh, on par with 2023. Most City facilities have the choice of being billed the global adjustment and HOEP directly, or through Time-of-Use rates with the Regulated Price Program (RPP). Rate optimization through the RPP saved $112,467 in 2024.

Chart 8: Annual Average Price of HOEP and Class B GA (2006-2024)



Eligible, high electrical demand customers can opt for a Class A[4] rate. Class A customers pay the GA costs based on their percentage contribution to the total monthly provincial GA costs, calculated on the top five peaks during a peak setting period. This is called the peak demand factor (PDF). Class A customers can impact their GA costs by reducing demand during peak periods, resulting in lower costs.

Class A sites within the City include 700 and 900 Woodward Avenue, 850 Greenhill Avenue, 78 Kenilworth North, Hamilton Stadium, and CUP Operations. The results for 2024 was a cost benefit (avoided costs) of $4.6M as shown in Table 8.

Table 8: 2024 Global Adjustment Class A Results[5]

Global Adjustment Class A Results	2024 Results	Cumulative Results
Levy (Tax) Supported Budget	$1,125,096	$14,369,510
Rate Supported Budget	$3,517,621	$45,815,323
Total	$4,642,717	$60,184,833

[4] Class A also referred to as Industrial Conservation Initiative (ICI), eligibility details located here: https://ieso.ca/Sector-Participants/Settlements/Global-Adjustment-Class-A-Eligibility.

[5]Annual global adjustment Class A cumulative benefits are shown from 2011-2024

NATURAL GAS RISK MANAGEMENT (HEDGING)

Average Commodity Price in 2024 was 25 % LESS than AMO Program

Natural gas can be a volatile commodity. There are many factors that can influence prices in natural gas markets including weather, supply, demand, world political events and changes to refining and extraction technologies for the gas itself. To maintain control of costs and minimize price volatility, the City has purchased its natural gas directly from the wholesale market (since June 2006). The City has supply agreements with multiple parties to allow for competitive purchasing, or "hedging".

Overall, the strategy for hedging is dynamic and adapts to changes in market conditions. A portion of natural gas supply may be purchased as much as two to three years in advance, while other portions are purchased just a month or two in advance. Fixing the price on portioned blocks of the City's natural gas volumes can result in better budget predictability and protection against market fluctuations, particularly during extreme weather conditions or unforeseen events.

The City benchmarks its natural gas hedging performance against the procurement program that is offered by the Association of Municipalities of Ontario / Local Authority Services (AMO/LAS)[6]. The AMO/LAS purchasing program is available for municipalities that do not have their own hedging programs. The comparison is shown in Chart 9 with overall results shown in Table 9.

Chart 9: Annual Average Price Comparison of City to AMO/LAS Natural Gas Program

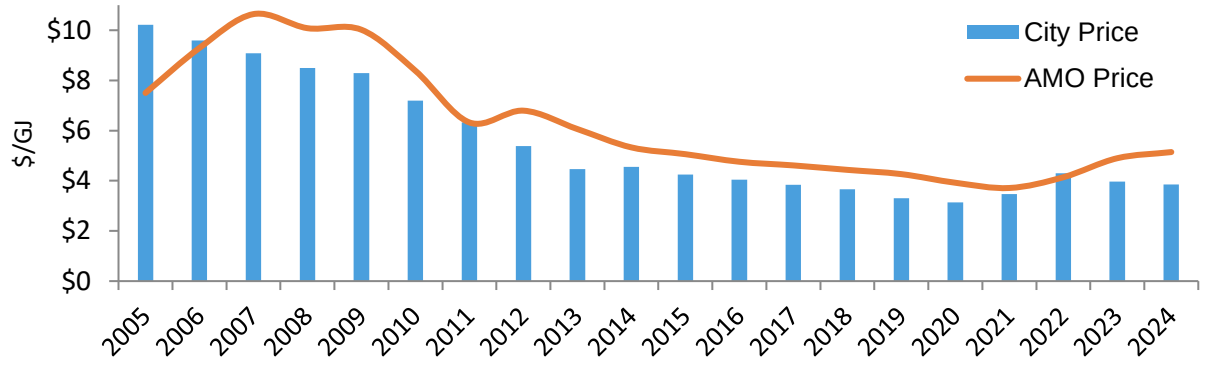


Table 9: 2024 Natural Gas Hedging Performance Results[7]

Natural Gas Hedging Performance Results	2024 Results	Cumulative Results
Levy (Tax) Supported Budget	$1,082,033	$9,468,365
Rate Supported Budget	$304,403	$1,961,572
Total	$1,386,436	$11,429,937

[6] Association of Municipalities of Ontario business services Natural Gas services offering here: https://www.las.on.ca/naturalgas
[7] Performance relative to AMO/LAS natural gas annual hedging program, cumulative 2005-2024.

NATURAL GAS AGREEMENTS FOR SUPPLY, TRANSPORTATION, STORAGE AND DELIVERY

The City manages its portfolio by utilizing contract management of varying tools for supply, delivery and storage and transportation of natural gas. In 2024, the City had master agreements for natural gas supply in place with Shell Energy North America (Canada) Inc., Tidal Energy Marketing Inc., Royal Bank of Canada and Twin Eagle Resource Management Canada LLC. All current supply counterparties have credit ratings that are compliant with the Corporate Energy and Sustainability Policy.

In addition, the City has agreements with Enbridge Gas that are required to facilitate the transportation, delivery, and storage of the City's natural gas supply. The utility agreements include direct purchase agreement (DPAs) for a pool of City sites, two T1 rate storage contracts for managing the Transit CNG and Hamilton Water biosolids plant and an M13 rate contract for production of renewable natural gas. The City also started the process of adding a third T1 storage rate for the new Transit CNG facility to be added in 2025.

Each DPA has its own specific delivery requirements, at different points along the variety of pipelines within North America and are reviewed and renewed annually. DPAs may also be amended throughout the year or adjusted to meet specific parameters or changes.

Table 10: Enbridge Utility Agreements Parameters 2024[8]

Contract Type	Parameter Volumes (GJ)	Accounts	Annual Term
DPA - SA7020	1115	249 misc. facility	Nov 1 – Oct 31
T1 – HSR	1559	HSR Mountain Transit CNG & Building	Sept 1 – Aug 31
T1 - Biosolids	588	Biosolids Plant at Woodward	May 1 – Apr 30
M13	N/A	RNG Production	Nov 1 – Oct 31

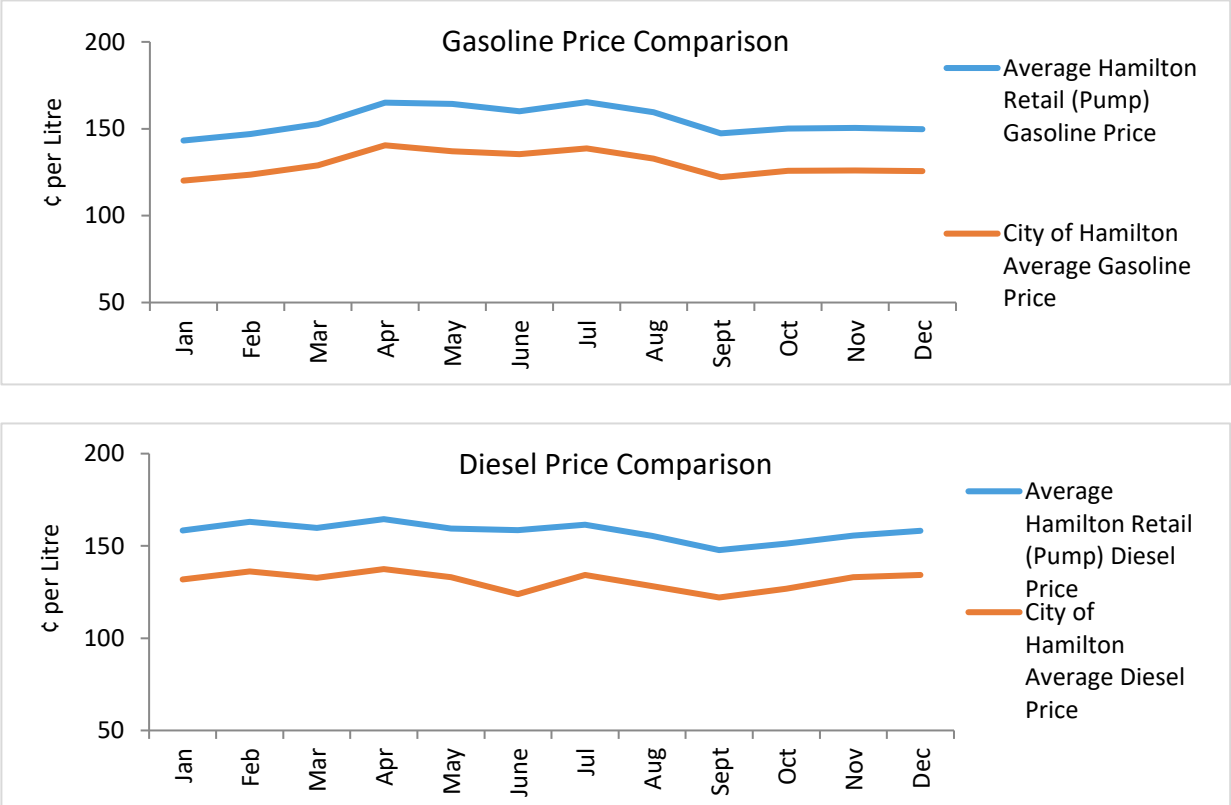
[8] Parameter volumes at renewal in 2024 – they be amended/adjusted throughout the year to accommodate changes at sites and/or pools of sites or to meet specific utility checkpoints (referred also as load balancing).

FUEL RISK MANAGEMENT

The City of Hamilton purchases diesel and gasoline fuel for its fleet of vehicles including buses, waste collection vehicles, snow removal trucks, street sweepers, forestry and parks vehicles, as well as Fire and Emergency Services vehicles. In addition, the City purchases fuel for Hamilton Police Services. In 2024, the City utilized a bulk supply agreement with Suncor Energy Products Partnership. Suncor Energy Products Partnership has a credit rating that is compliant with the Corporate Energy and Sustainability Policy.

The pricing for diesel and gasoline for 2024 was the daily "rack" price of each required fuel type from Hamilton terminal with negotiated discounts, delivery charges and taxes. Compared to retail pricing, the negotiated contract assures the City is getting the lowest available price on the market for that day.

Charts 10 &11: 2024 Monthly Price Comparison of City to Retail Prices[9]



Fuel contracts are reviewed annually and, based on pricing, deliverability and fuel types, the purchasing strategy can be adjusted accordingly.

[9] Monthly average retail prices for diesel and gasoline are reported for the Hamilton area.

PART 3

ANNUAL CORPORATE GHG INVENTORY

Corporate GHG Emissions inventory ***32% Reduction*** *since 2005*

Corporate GHG Emissions increase of 7% when compared to 2023

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 and the Board of Health Climate Change Actions 2012 report (BOH13024). The original targets were a 50% reduction by 2030 and an 80% reduction in GHG emissions by 2050 from the base year 2005. With the update to the Corporate Energy and Sustainability Policy, the long-term target was updated to net zero emissions by 2050 when compared to the base year 2005.

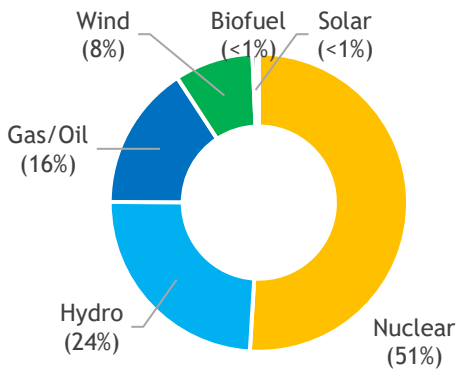
2024 INVENTORY RESULTS

In 2024, the GHG corporate emissions inventory was 83,947 tonnes of CO_2e (carbon dioxide equivalent). This represents a **32%** reduction from the 2005 base year (122,699 tonnes CO2e) and 7% increase compared to 2023. The inventory does not include HRPI operations.

Chart 12: City of Hamilton Corporate GHG Emissions Year Trends 2005-2024

The inventoried emissions have risen over the past few years due to several contributing factors including the resumption of normal City operations after the pandemic, increases in the number of fleet vehicles and changes to calculated emissions factors. It is important to recognize that the inventory is representative of absolute emissions and not intensity.

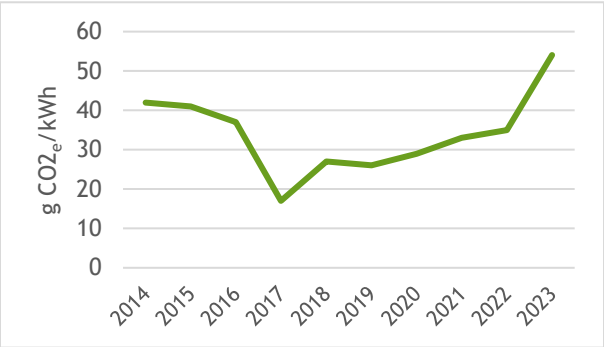
Chart 13: 2024 Ontario Energy Output by Fuel Type[10]



The refurbishment of Ontario's nuclear fleet has resulted in increased natural gas generation and higher electricity-related emissions over the past three years. Emissions may continue to rise as Ontario's electricity grid is forecast to increasingly rely on natural gas generation through the next five years but is expected to stay below baseline because of the earlier removal of coal-fired generation as part of the generation supply mix.

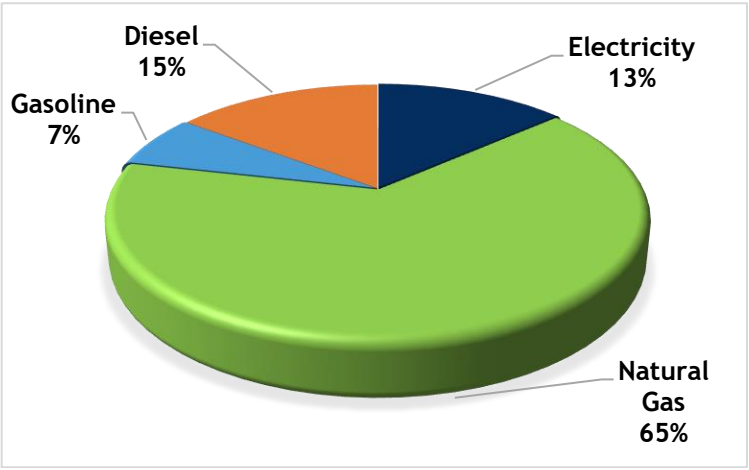
The charts generation mix is reported by the Independent Electricity System Operator (IESO) for transmission-connected generation. It does not include embedded generation but shows what makes up the supply mix and can vary year over year. The provincial emissions factors are impacted by changes to the generation mix. Broadly speaking, the short-term outlook for the provincial grid is expected to increase constraints for reducing emissions overall.

Chart 14: Ontario Electricity Emissions Factors, 2014-2023[11]



Other impacts to the City's inventory include completion of energy efficiency projects, reductions in usage from operational improvements and fuel switching, such as Transit's ongoing conversion from diesel buses to CNG-powered buses. Future developments around this area, particularly the utilization of renewable natural gas and electric-power transportation for City's fleet and transit vehicles should significantly impact GHG emissions for the City.

Chart 15: 2024 Percent of tCO2e Emissions by Fuel Source

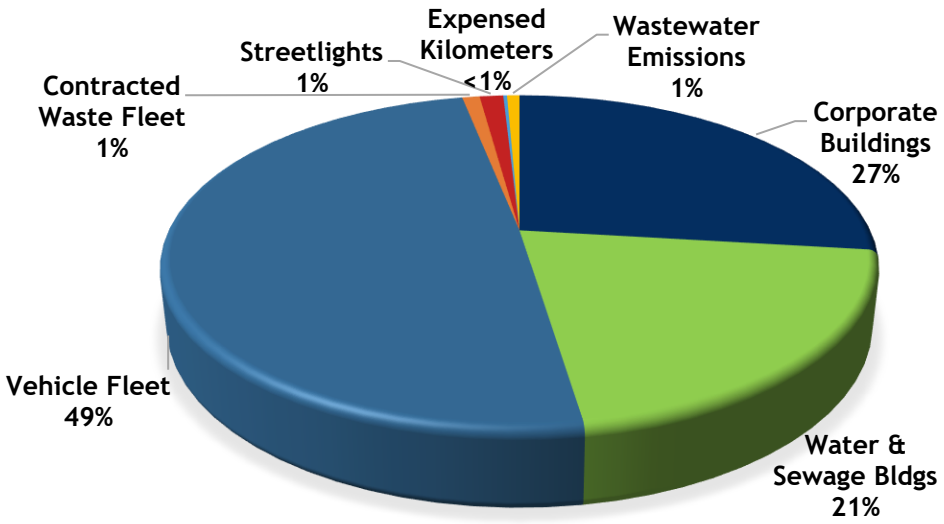


Corporately, the generation mix for the City's inventoried emissions is as follows: electricity, natural gas, diesel and gasoline.
Ideally, renewable energy sources would be used to offset the higher emission fuel sources such as diesel, gasoline and natural gas. Natural gas is used in both buildings and to power 85% of the City's bus fleet. Renewable natural gas in an option that could be utilized to reduce emissions in the City's buildings and fleet and is one of the focus areas of the City's PNZ plans.

[10] Generation data published by the IESO at: https://ieso.ca/en/Power-Data/Supply-Overview/Transmission-Connected-Generation
[11] Emissions factors are published in the National Inventory Report on a two-year delay

2024 CITY GHG EMISSIONS INVENTORY SECTORS

Chart 16: 2024 Percent of tCO_2e Emissions by Reporting Sector



Of the reported sectors, vehicle fleet remains the largest emitter with 49% of corporate emissions for 2024. Corporate buildings represent 27% and Water and Sewage operations with 21% round out the top 3. The other sectors account for the remaining 3%.

Table 11: 2024 Breakdown of tCO_2e by Sector

Sector	2023 Total CO2e	2024 Total CO2e	2024 vs Base Year	2024 vs 2023
Corporate Buildings	21,314	22,461	-51%	5%
Vehicle Fleet	39,273	41,200	14%	5%
Water & Sewage Buildings	15,674	17,284	-31%	10%
Contracted Waste Fleet	697	793	-91%	14%
Streetlights & Traffic Lighting	800	1,073	-80%	34%
Expensed Kilometers	168	171	-65%	2%
Wastewater Emissions	561	565	8%	1%
City Wide Total	78,487	83,948	-32%	7%

Fuel switching from diesel buses to CNG fueled buses has lowered emissions comparatively, however Transit has increased its fleet size by 15% over the past three years, resulting in an absolute increase in emissions.

The increase in electricity emissions factors noted above has impacted facilities and lighting where the combined usage may have decreased, but the emissions have increased.

2024 ANNUAL REPORT: FINAL THOUGHTS

One of Hamilton's long-term goals is to reduce its energy intensity by 45% by 2030. Despite some energy efficient project activity that did deliver energy usage reductions and GHG reductions, the impacts of project activity alone is not large enough to meet those targets. At the current energy intensity reduction rate of 1-2% per year on average, the City could fall short of its 2030 intensity target unless its broader plans are adopted. The City has developed strategies to further reduce energy intensity and by implementing existing Pathway to Net Zero plans, creating new plans and projects for additional facilities, and continuing to make operational improvements, it is possible to achieve those goals. Funding and budget constraints continue to be a barrier.

The City has set a goal to reduce absolute emissions by 50% by 2030 and to become a net-zero city by 2050. Both of those goals are ambitious and will require all City departments to implement actionable plans and policies to actively reduce energy usage and GHG emissions. Many divisions have begun to address the targets by:

- Improving operational efficiencies with equipment and lifecycle replacements;
- Creating resiliency policies around climate change;
- Creating green policies for procurement of new equipment;
- Forming and implementing Pathway to Net Zero plans;
- Utilizing low or carbon neutral fuels; and
- Installing and utilizing electric vehicle infrastructure

Investment in renewable energy generation and the use of low carbon fuels within City facilities and fleet is needed. Developing carbon-reducing/carbon-neutral projects and prioritizing climate action is also imperative across the City if we hope to meet the 2050 targets.

As always, continued measurement and reporting on results help to identify where the City falls in line with its goals and allows for more targeted decision-making as we move through the ever-changing energy landscape. Additional details on specific reporting items can be found in the Appendix A.

The City of Hamilton's commitment to energy conservation and environmental sustainability plays an important role in supporting the City's Strategic Plan by contributing to a prosperous and healthy community; providing valued and sustainable services; and demonstrating innovation and leadership. Ongoing success of the energy program requires engagement of all Five Values of Our Culture - Collective Ownership; Steadfast Integrity; Sensational Service; Engaged, Empowered Employees; and Courageous Change.

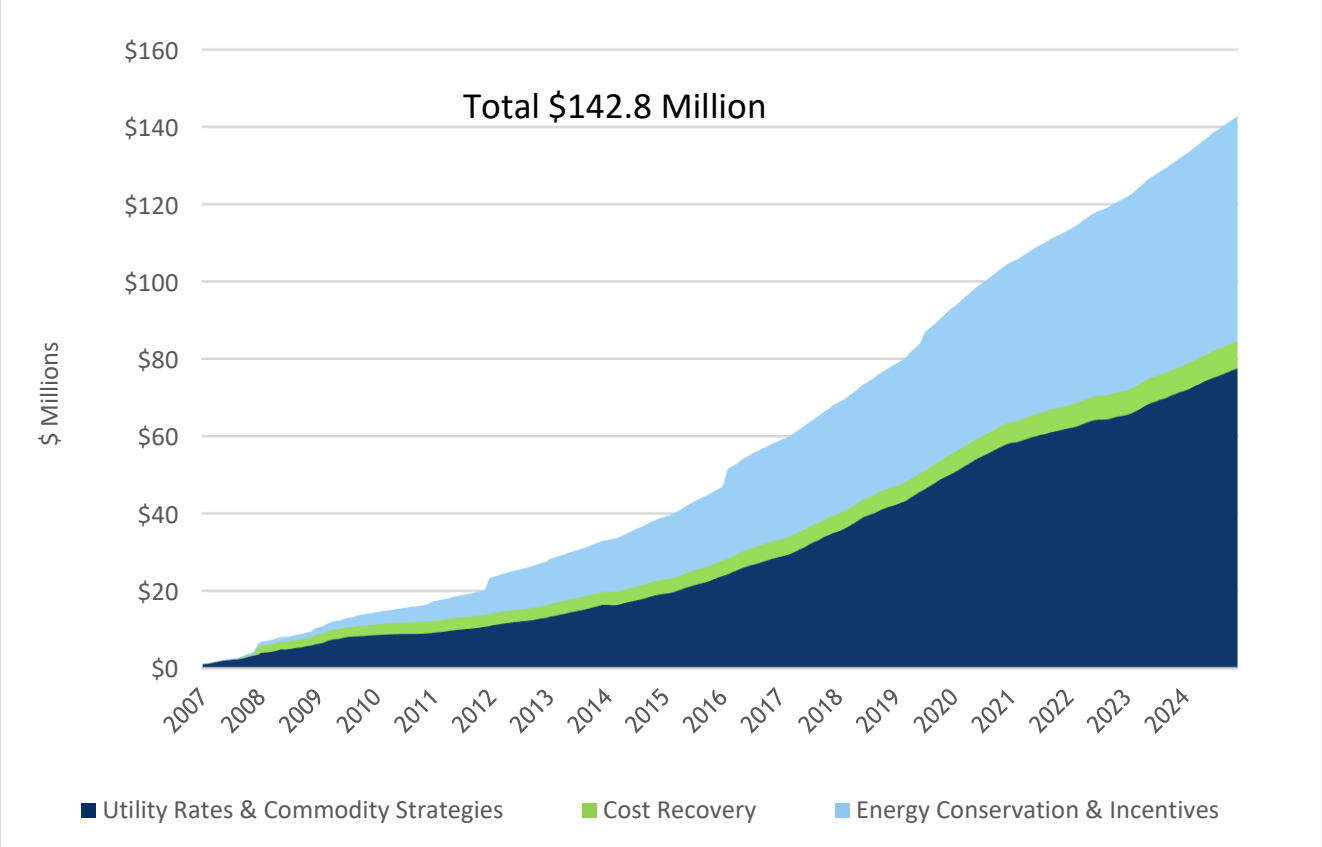
APPENDIX

A - CHARTS

This appendix provides additional information, charts, and graphs for more specific details on KPI results and impacts to various KPIs for 2023 as presented in the report.

PART 1: ENERGY KPI REPORTING

A-1: Cumulative Savings and Avoided Costs 2005-2024

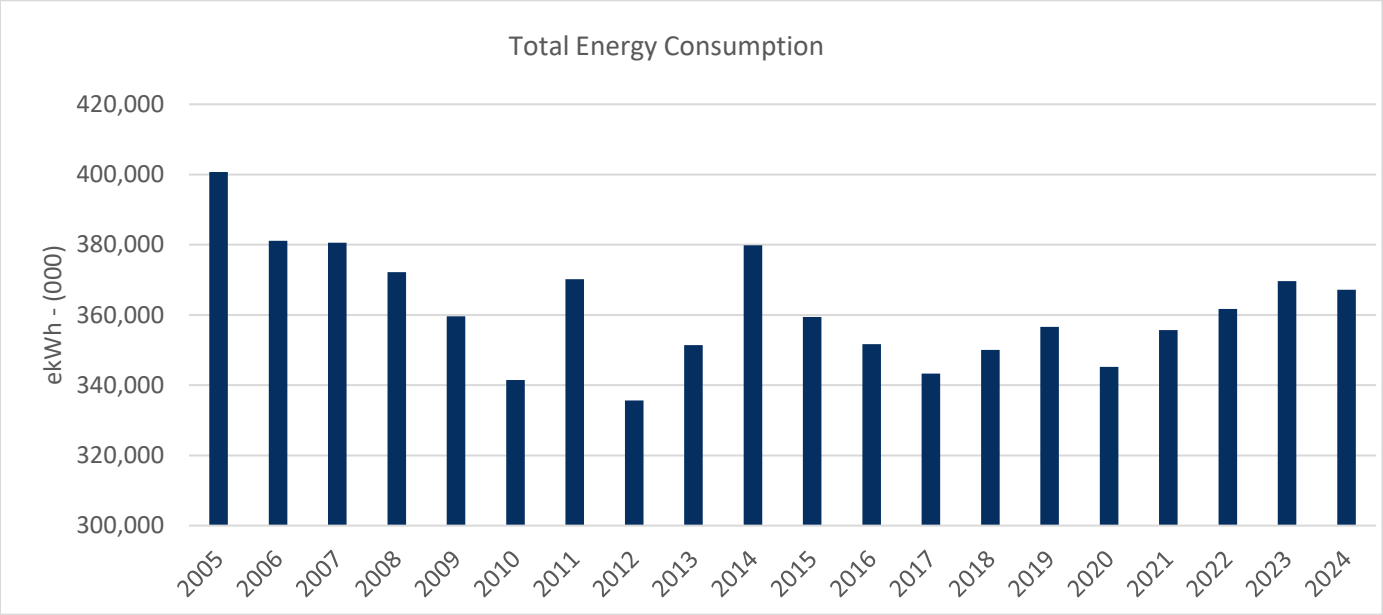


A-2: Three-Year Comparison of Energy Programs and Strategies

	2022	2023	2024	2006-2024 Cumulative
RPP/Interval Change	$0	$0	$112,467	$5,872,281
Global Adjustment	$3,557,985	$5,208,191	$4,642,717	$60,184,833
Natural Gas Hedging	-$127,514	$854,427	$1,386,436	$11,429,937
Energy Conservation	$4,353,341	$4,243,615	$4,271,388	$46,138,866
Incentives	$215,504	$98,438	$25,827	$12,160,601
Cost Recovery	$507,055	$145,167	$468,766	$6,991,951
Totals	$8,506,370	$10,549,838	$10,905,547	$142,778,468

ENERGY CONSUMPTION AND COSTS

A-3: Total Annual Consumption Electricity & Natural Gas (Facilities)



A-4: Electricity Consumption Comparison by Portfolio Category (in 000's of kWhs)

	2005	2023	2024
City/Town Halls	4,736	3,907	3,874
Corporate Facilities	4,669	5,186	5,107
Street Lighting	33,603	17,510	17,584
Traffic Lighting	5,688	1,218	1,228
Other City Operations	5,248	4,061	4,142
Hamilton Water	106,561	107,243	106,721
Yards	11,982	8,672	8,849
Arenas	17,834	15,333	16,081
Community/Senior Centers	1,258	1,442	1,399
Recreation Centres/Pools	4,124	7,777	8,032
Hamilton Stadium	n/a	5,462	5,684
Recreation Parks/Golf	3,885	3,075	3,027
Lodges	4,673	5,177	5,426
Culture	2,254	1,909	1,945
Fire/ EMS	3,766	4,528	4,584
Hamilton Public Libraries	7,314	7,029	7,258
First Ontario Centre	6,578	n/a	n/a
First Ontario Concert Hall	3,552	n/a	n/a
Hamilton Convention Centre	3,026	n/a	n/a
Hamilton Police Services	5,613	5,688	5,955
City Wide Total	236,362	205,217	206,897

A-5: Natural Gas Consumption Comparison by Portfolio Category (in 000's of m3)

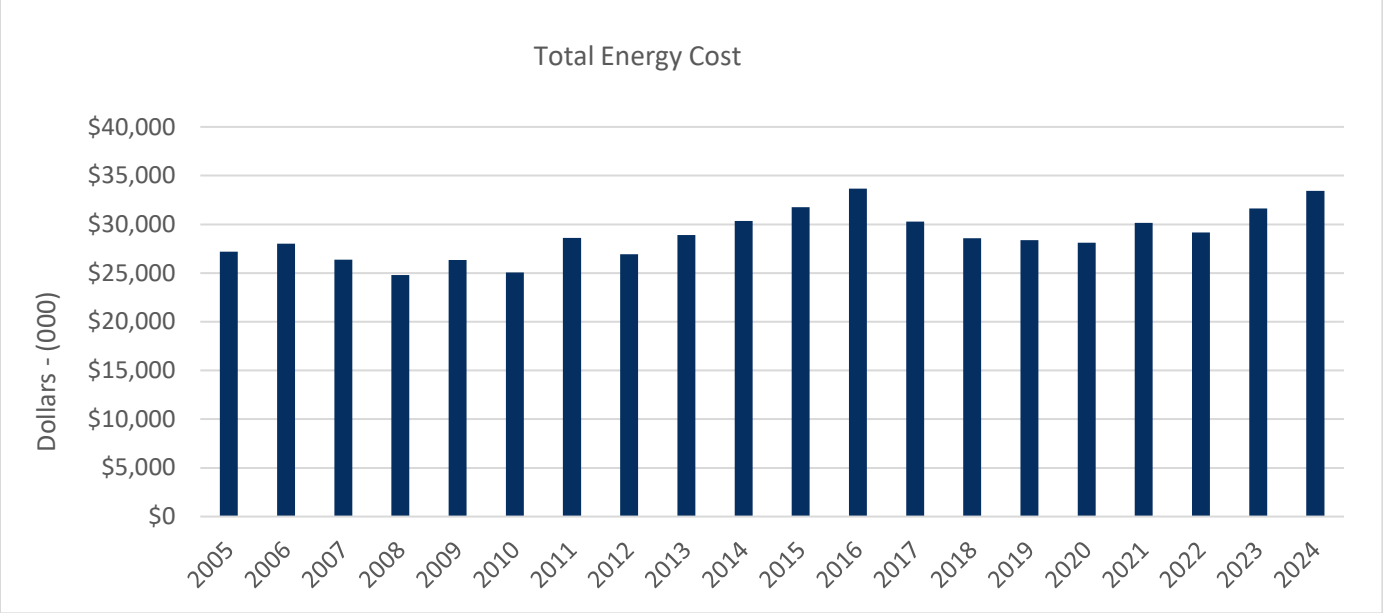
	2005	2023	2024
City/Town Halls	847	354	320
Corporate Facilities	1,173	551	542
Street Lighting	0	0	0
Traffic Lighting	0	0	0
Other City Operations	35	0	0
Hamilton Water	1,357	6228	6019
Yards	2,587	1538	1536
Arenas	2,068	1777	1779
Community/Senior Centers	241	202	183
Recreation Centres/Pools	2,124	2108	2061
Hamilton Stadium	n/a	267	260
Recreation Parks/Golf	417	210	223
Lodges	1,899	935	1000
Culture	293	174	162
Fire/ EMS	650	679	640
Hamilton Public Libraries	190	248	208
First Ontario Centre	332	n/a	n/a
First Ontario Concert Hall	179	n/a	n/a
Hamilton Convention Centre	153	n/a	n/a
Hamilton Police Services	857	598	543
City Wide Total	15,404	15,869	15,475

A-6: Combined Energy Consumption Comparison by Portfolio Category (in 000's of ekWh)

	2005	2023	2024
City/Town Halls	13,775	7,570	7,184
Corporate Facilities	17,188	10,900	10,723
Street Lighting	33,602	17,510	17,584
Traffic Lighting	5,688	1,218	1,228
Other City Operations	5,618	4,061	4,142
Hamilton Water	121,040	171,765	169,078
Yards	39,589	24,601	24,765
Arenas	39,904	33,743	34,514
Community/Senior Centers	3,834	3,536	3,292
Rec Centres/Pools	26,789	29,621	29,382
Hamilton Stadium	n/a	8,223	8,374
Rec Parks/Stadiums/Golf	8,332	5,250	5,334
Lodges (Macassa, Wentworth)	24,938	14,861	15,785
Culture	5,383	3,715	3,628
Fire/ EMS	10,698	11,565	11,210
Hamilton Public Libraries	9,343	9,595	9,413
First Ontario Centre	10,122	n/a	n/a
First Ontario Concert Hall	5,466	n/a	n/a
Hamilton Convention Centre	4,656	n/a	n/a

Hamilton Police Services	14,757	11,884	11,581
City Wide Total	400,722	369,618	367,218

A-7: Total Annual Reported Costs Electricity & Natural Gas (Facilities)

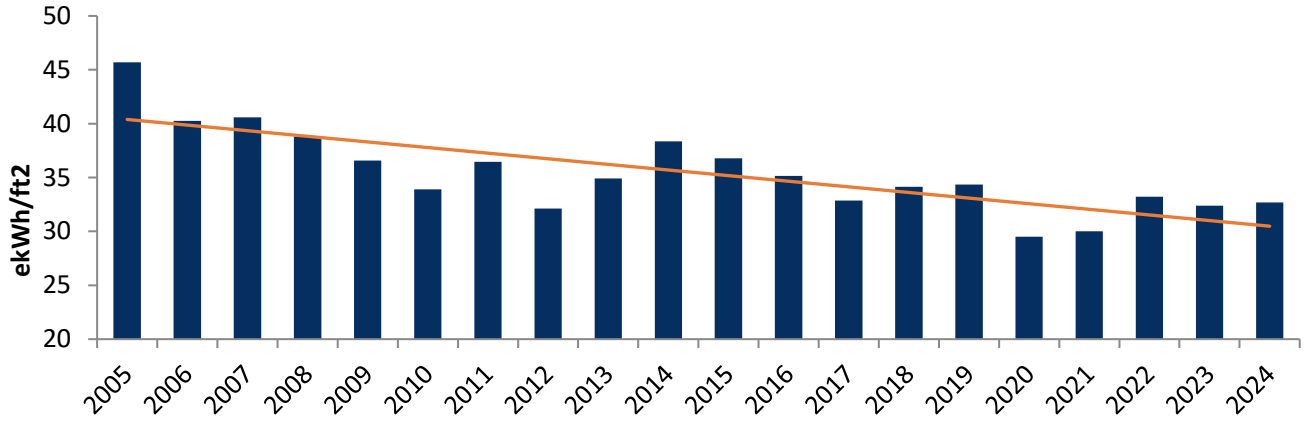


A-8: Total Reported Cost Comparison by Portfolio Category

	2005	2023	2024	2024 vs 2005	2024 vs 2023
City/Town Halls	$860	$846	$853	-1%	1%
Corporate Facilities	$866	$933	$926	7%	-1%
Street Lighting	$2,895	$3,679	$4,006	38%	9%
Traffic Lighting	$462	$220	$232	-50%	5%
Other City Operations	$534	$571	$617	16%	8%
Hamilton Water	$9,590	$12,916	$14,124	47%	9%
Yards	$2,205	$1,803	$1,839	-17%	2%
Arenas	$2,455	$2,825	$3,033	24%	7%
Community/Senior Centers	$224	$296	$286	28%	-3%
Recreation Centres/Pools	$1,192	$1,854	$1,865	56%	1%
Hamilton Stadium	n/a	$853	$897	n/a	5%
Recreation Parks/Golf	$564	$561	$369	-35%	-34%
Lodges	$1,087	$934	$942	-13%	1%
Culture	$338	$306	$320	-5%	5%
Fire/ EMS	$614	$864	$872	42%	1%
Hamilton Public Libraries	$827	$922	$949	15%	3%
First Ontario Centre	$840	n/a	n/a	n/a	n/a
First Ontario Concert Hall	$454	n/a	n/a	n/a	n/a
Hamilton Convention Centre	$387	n/a	n/a	n/a	n/a
Hamilton Police Services	$783	$1,241	$1,312	68%	6%
City Wide Total	$27,177	$31,625	$33,443	23%	6%

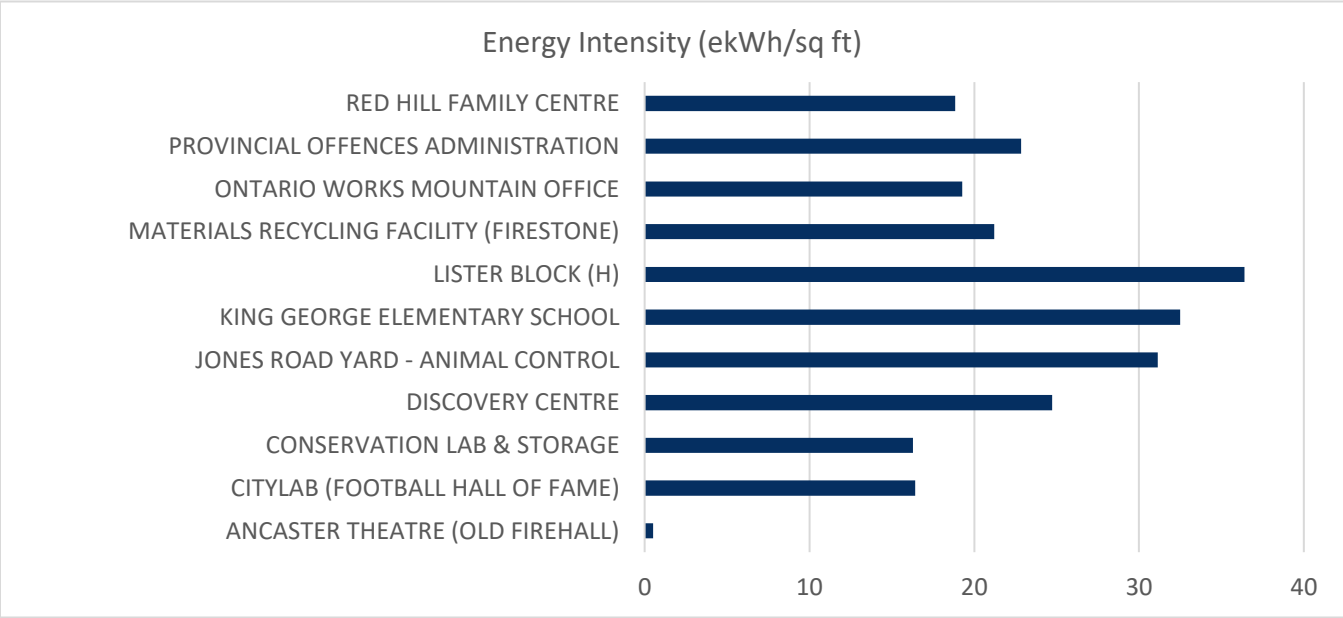
ENERGY INTENSITY

A-9: Total Annual Energy Intensity (ekWh/sqft)

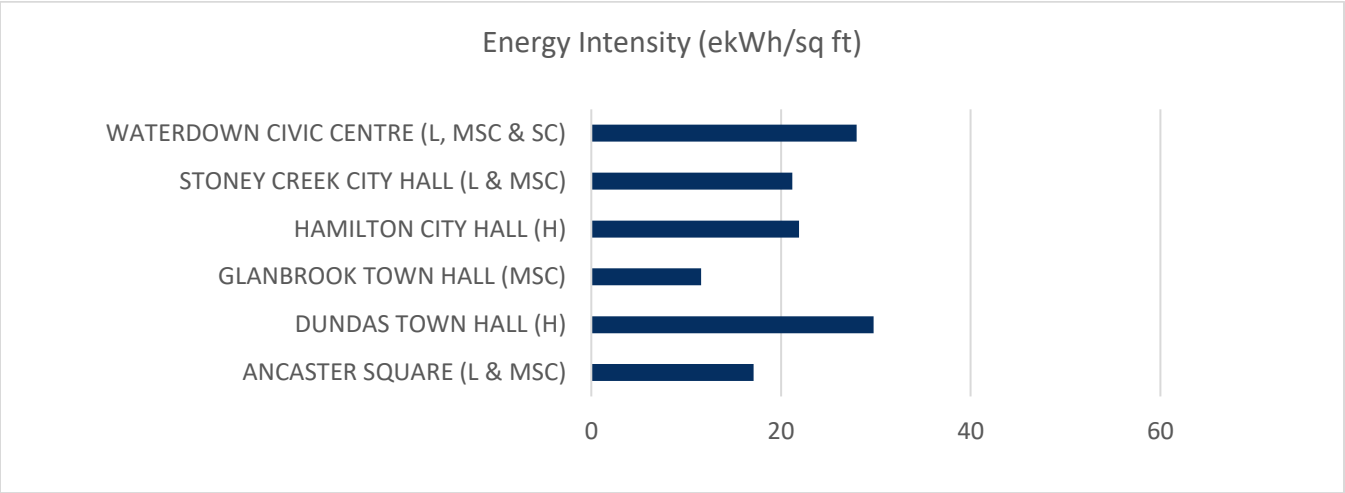


The following series of graphs represent the energy intensity results per site for 2023 within the specific portfolio categories. Sites that did not have square footage were removed but were included in the overall consumption and costs data sets. Sites were only included if there were full data sets for the year. There is no energy intensity data for Hamilton Water and Operational (O&M) sites. Also note that the energy intensity axis value may be adjusted depending on grouping.

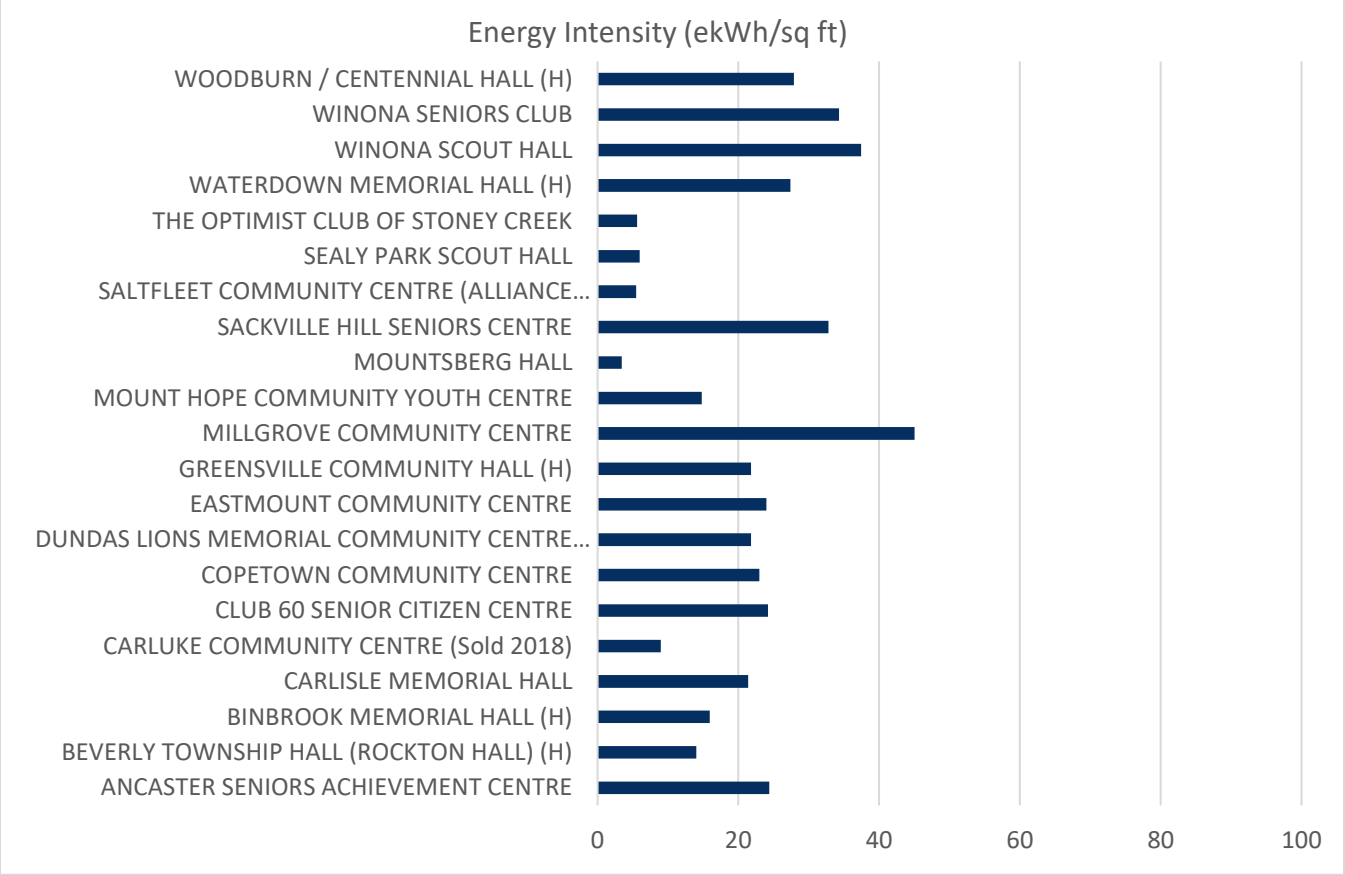
A-10: 2024 Energy Intensity Corporate Facilities



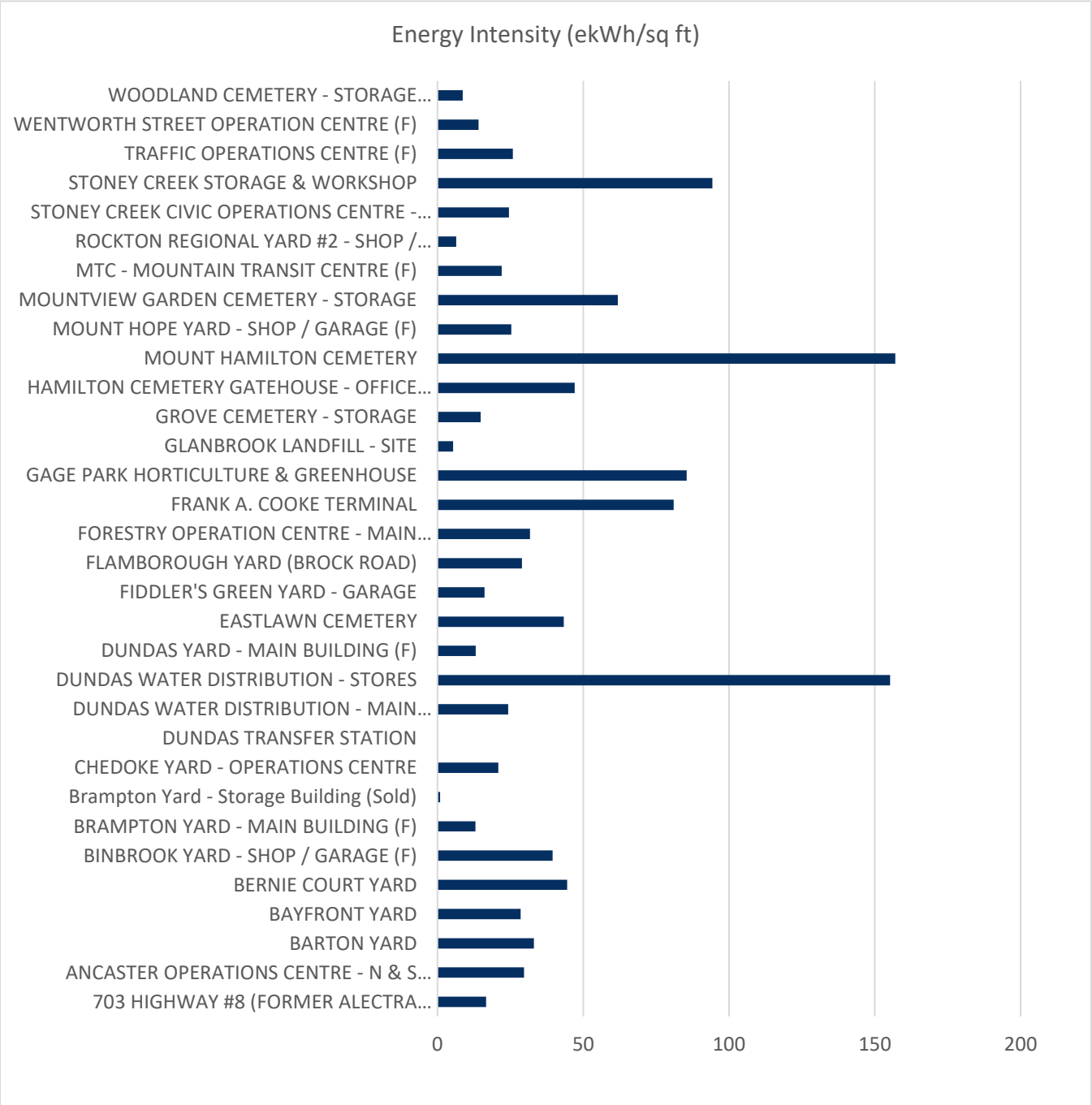
A-11: 2024 Energy Intensity Town Halls



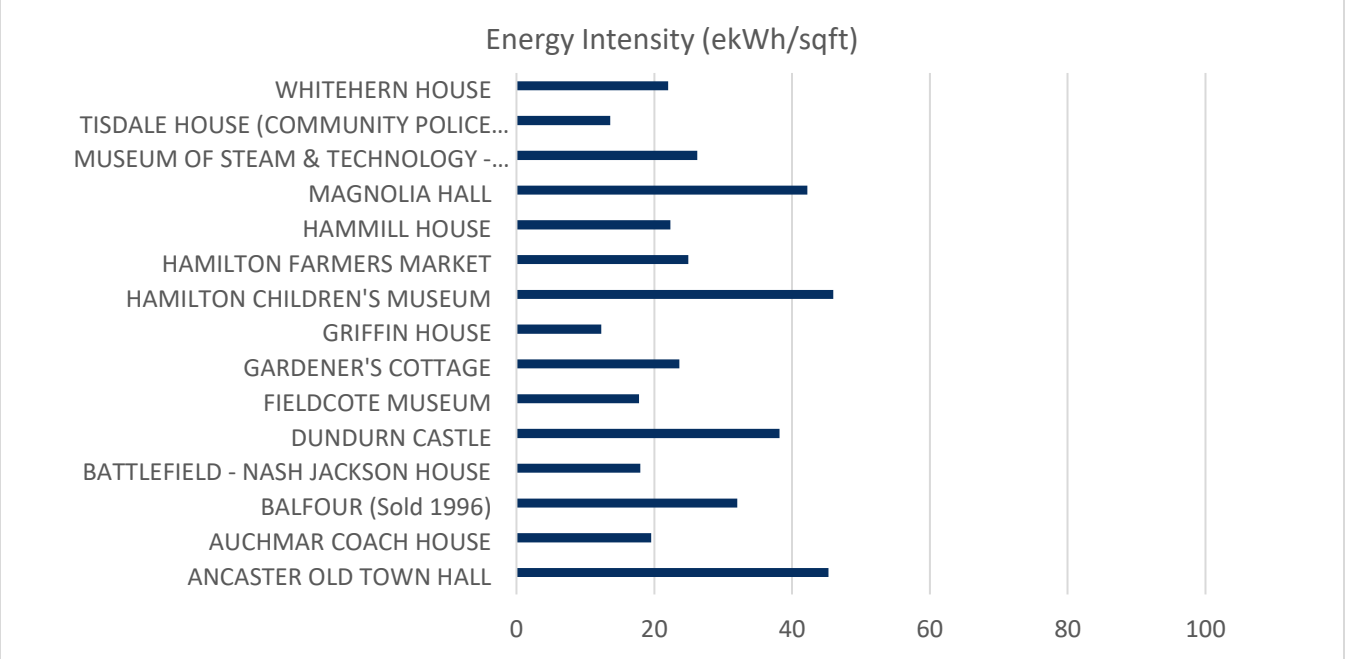
A-12: 2024 Energy Intensity Community Centres



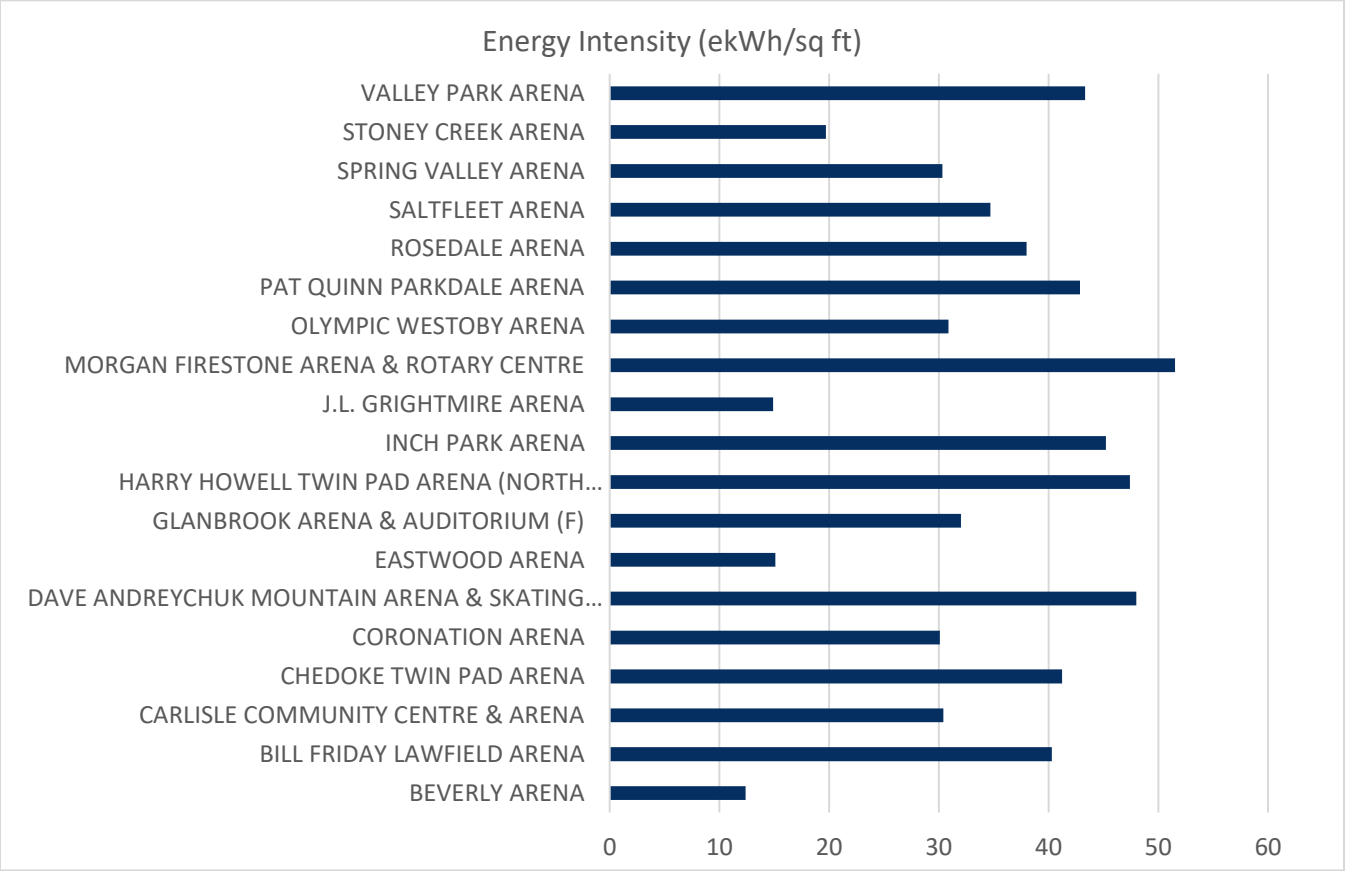
A-13: 2024 Energy Intensity Yards



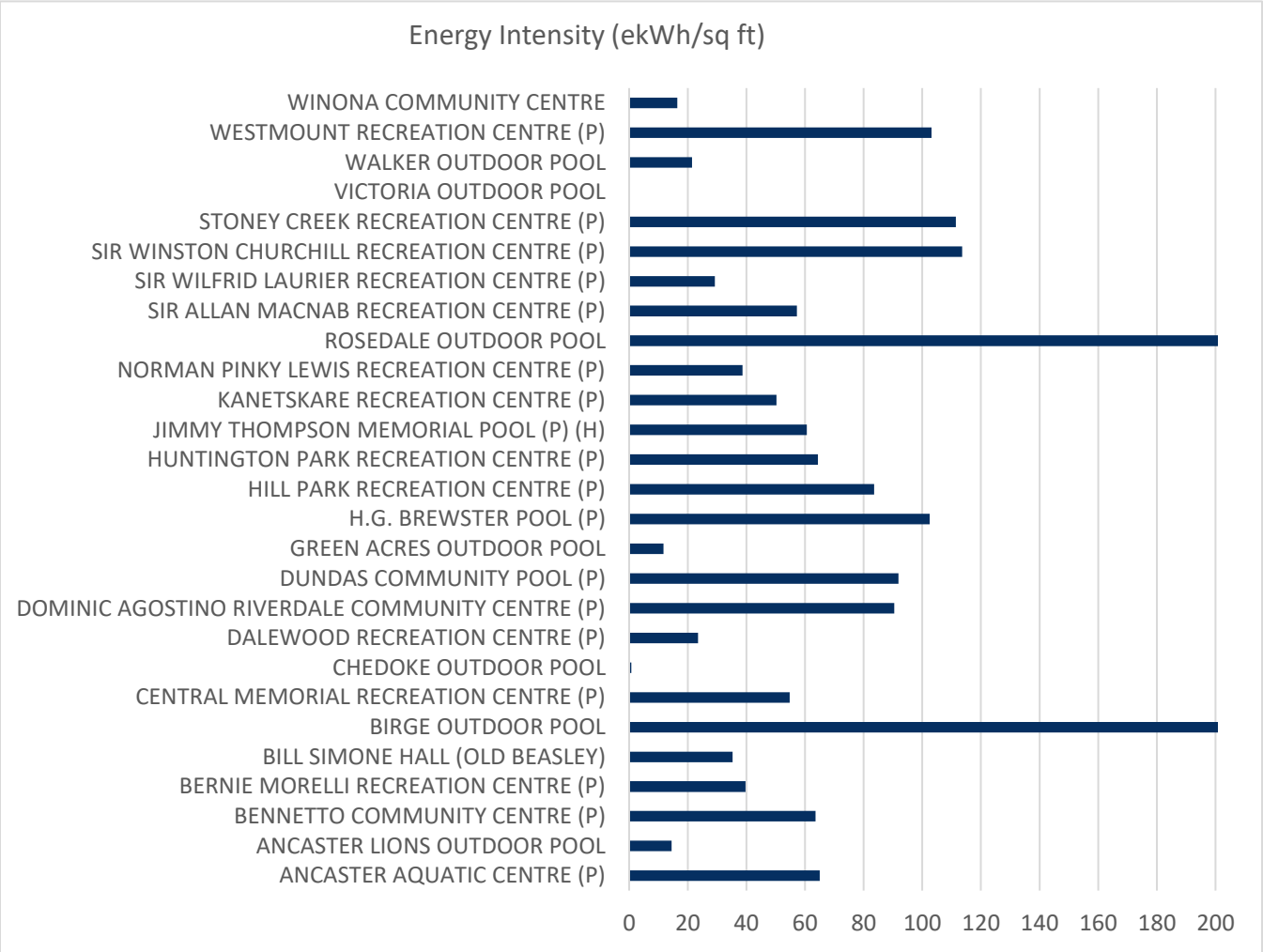
A-14: 2024 Energy Intensity Culture and Museums



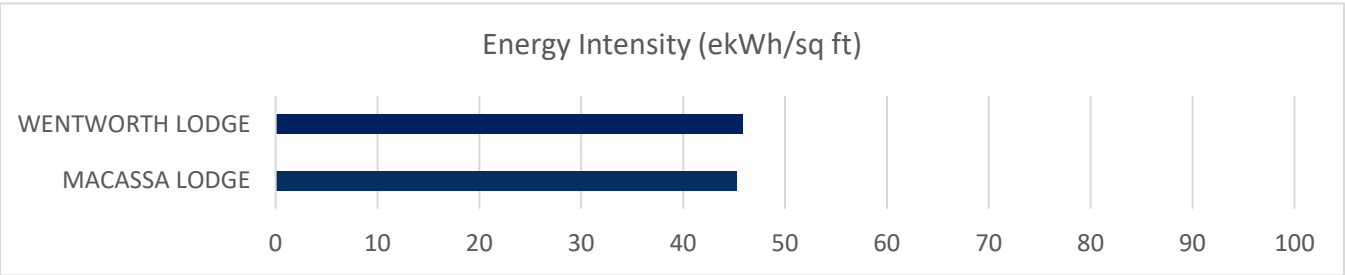
A-15: 2024 Energy Intensity Arenas



A-16: 2024 Energy Intensity Recreation Centres and Pools[12]

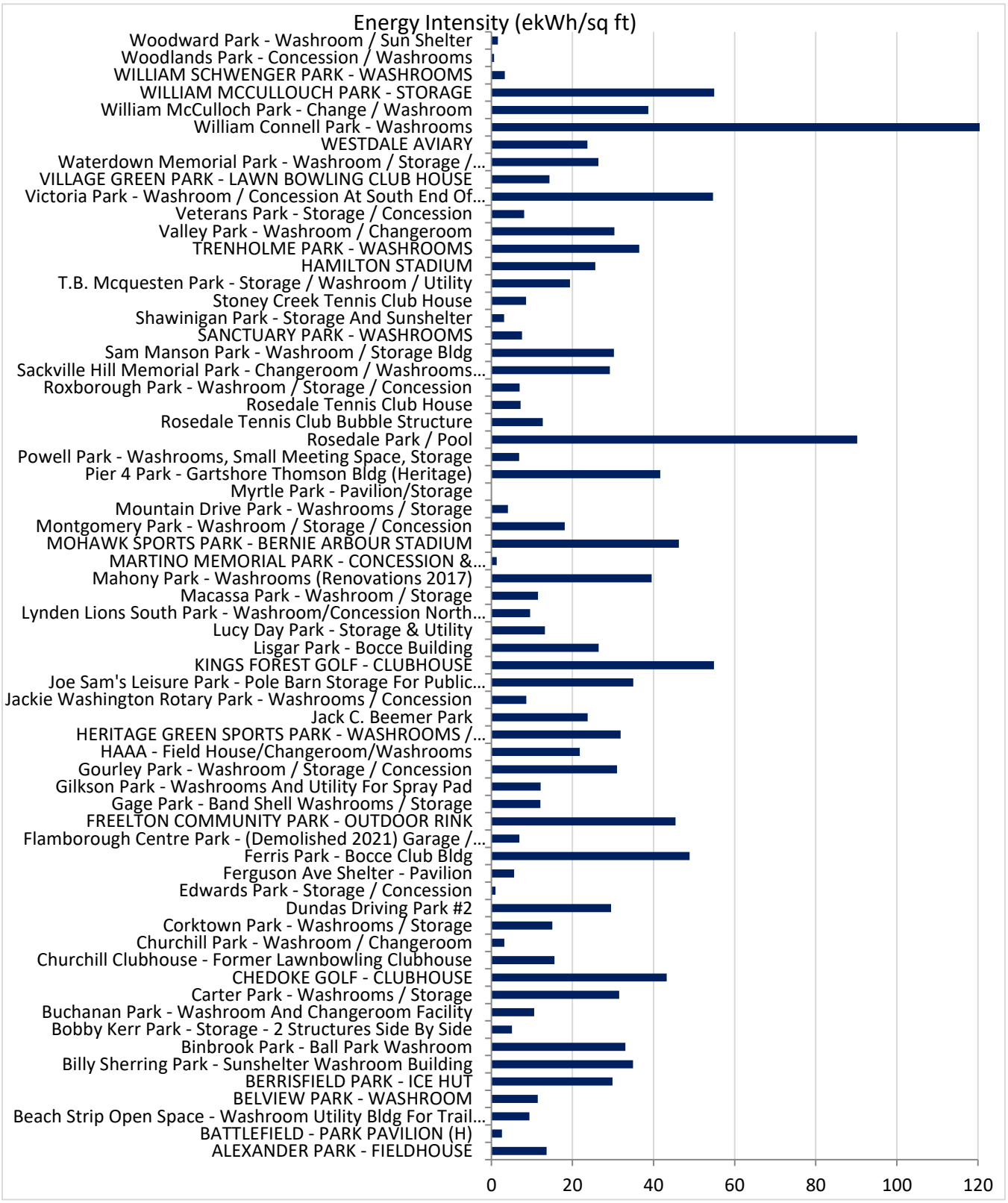


A-17: 2024 Energy Intensity Lodges

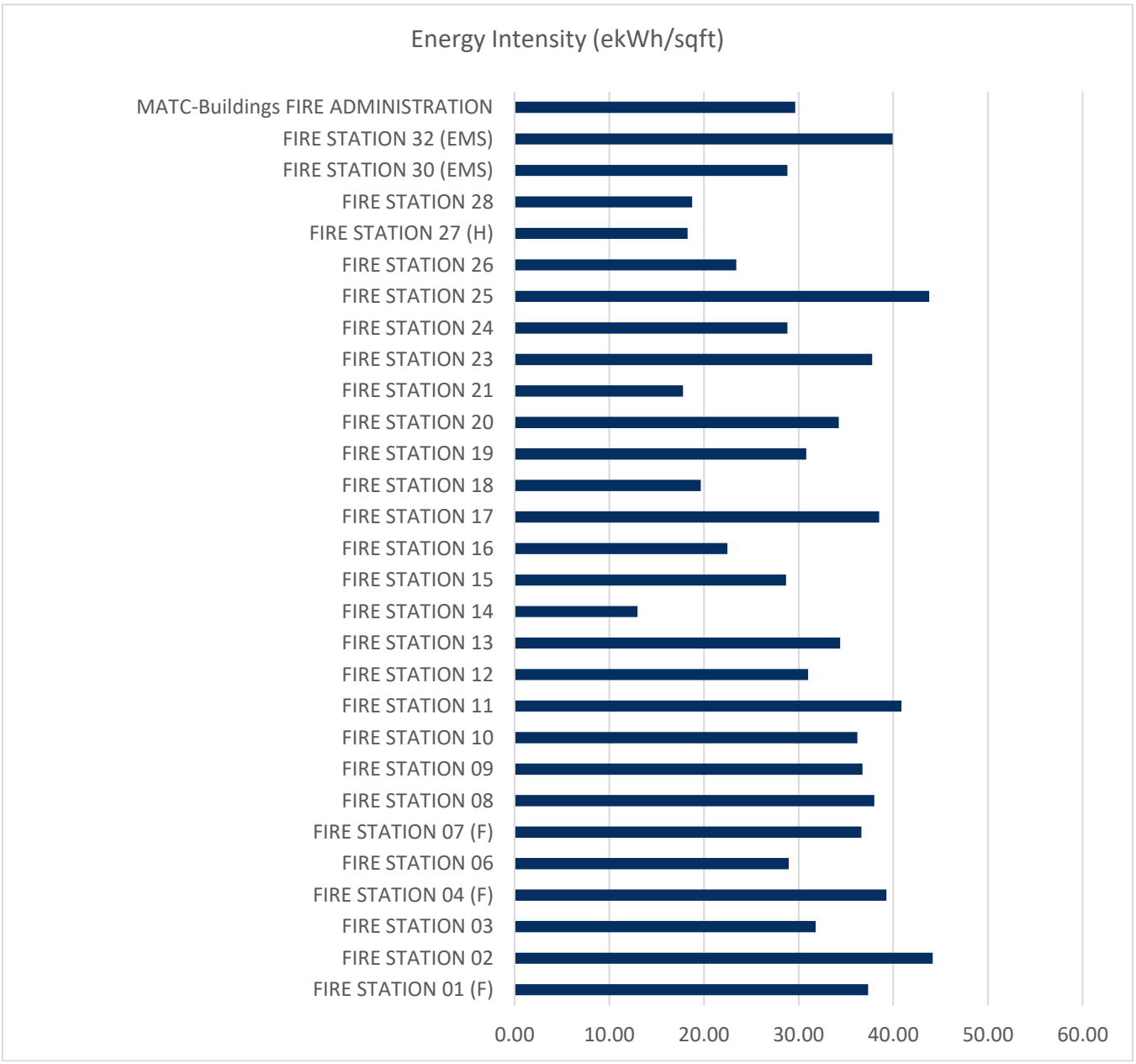


[12] (P) = facility with an indoor pool

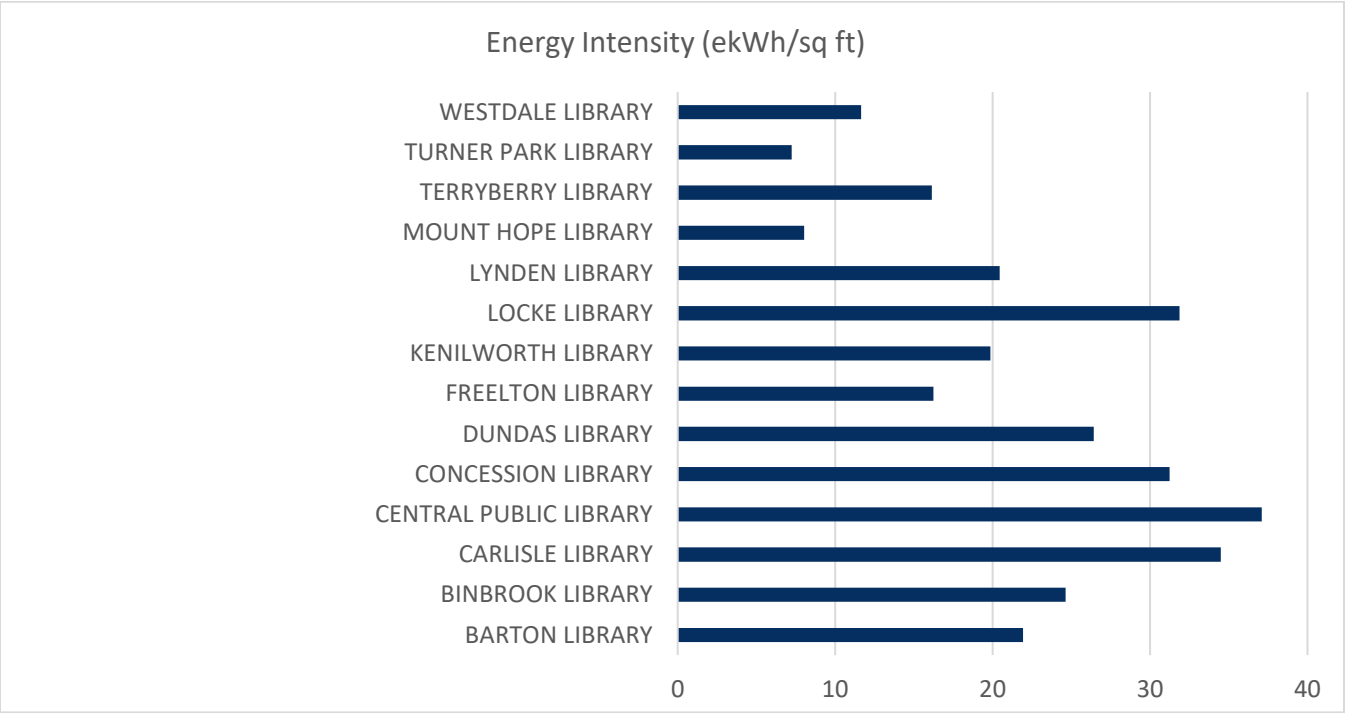
A-18: 2024 Energy Intensity Stadium, Golf Course Facilities & Recreation Parks Facilities



A-19: 2024 Energy Intensity Fire and EMS Facilities



A-20: 2024 Energy Intensity Libraries



FUELS

The following chart breaks down the fuel usage by user group category. For further clarification:

- Transit includes Transit Operations, Route Planning and Transit Yard Support;
- Operations includes Waste Management (non-contracted), Landfill, Roads, and Support Services; and;
- "Other" includes Public Health, Recreation, Tourism, Library, Bi-Law Services, Clerks, Information Services and Fire and EMS.

A-21: 2024 Fuel Usage by User Group

	Diesel (L)	Unleaded (L)	CNG DLE	Total (DLE)
Corporate Asset Management	5,750	11,174		16,924
Corporate Facilities and Energy	4,878	93,081		97,959
Engineering Services	0	35,728		35,728
Environmental Services	372,379	342,173		714,552
Waste Management	641,360	37,469		678,829
Hamilton Water	126,392	215,788		342,180
Operations	818,902	426,541		1,245,443
Transportation	93,475	35,627		129,102
Other	442,435	1,263,066		1,705,501
Transit	2,124,970	56,257	12,797,852	14,979,079
Total	4,630,540	2,516,904	12,797,852	19,945,296

WEATHER DATA

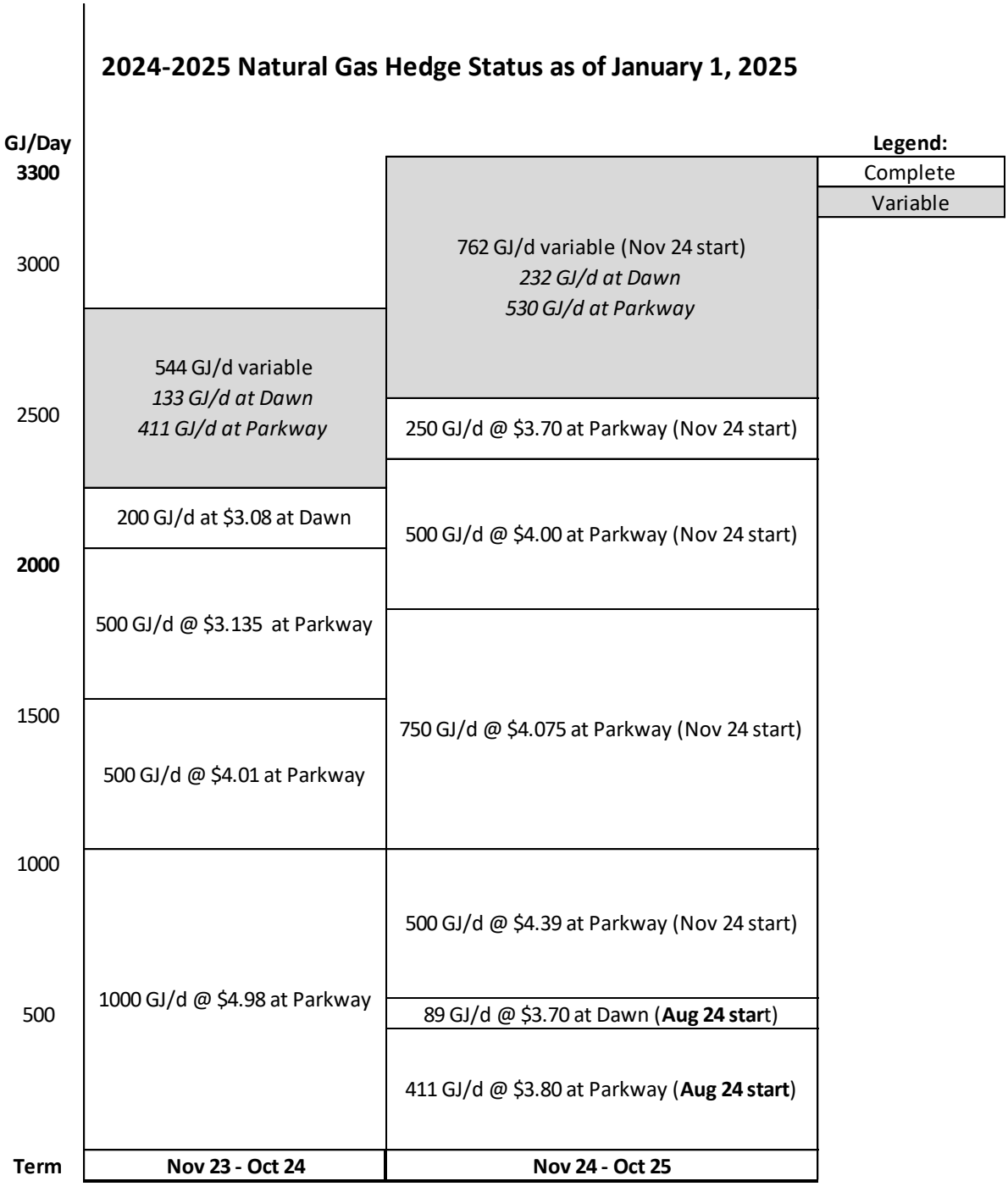
Weather and temperatures can impact energy consumption for electricity, natural gas and fuel. Reviewing cooling degree days (CDD) and heating degree days (HDD) can help identify one reason why consumption could be higher or lower year over year. CDD is a measure of how much (in degrees) and for how long, the outside air temperature was higher than a specific base temperature. HDD is a measure of how much and for how long the outside temperature was lower than a specific base temperature. The base temperature for this reporting is 18 degrees Celsius and is sourced from Environment Canada. According to data for Hamilton weather station YHM, the annual Total cooling degree days in 2024 was 298. The total heating degree days in 2024 was 3,250. Details shown in the chart below.

A-22: 2024 Weather Data for Hamilton (Environment Canada – Station YHM) compared to 2023 and 5-year Averages

Month	Mean Temp (◦C)	2024 HDD	2024 CDD	2024 vs 2023 HDD	2024 vs 5YR Avg HDD	2024 vs 2023 CDD	2024 vs 5YR Avg CDD
Jan-24	-2.7	643	0	15%	-1%	-	-
Feb-24	0.0	522	0	19%	-5%	-	-
Mar-24	3.5	449	0	-5%	-4%	-	-
Apr-24	8.2	294	0	3%	-11%	-100%	-
May-24	15.6	89	15	-46%	-42%	136%	-15%
Jun-24	19.3	28	66	-12%	-4%	103%	12%
Jul-24	21.5	2	110	122%	9%	27%	5%
Aug-24	19.8	15	73	-26%	81%	68%	-14%
Sep-24	18.1	27	31	-46%	-51%	8%	39%
Oct-24	11.0	217	1	10%	-3%	-88%	-60%
Nov-24	5.7	372	1	-13%	-4%	0%	192%
Dec-24	-1.1	592	0	28%	10%	-	-
2024 Annual Total		**3250**	**298**	**4%**	**-4%**	**41%**	**87%**

PART 2: COMMODITY HEDGING & RATE OPTIMIZATION

A-23: 2024 Natural Gas Hedge Profile (greater than 1-month terms) as of Jan 1, 2025[13]



A-24: 2024 and Cumulative Class A Global Adjustment Results

[13] Shows hedged blocks of volume and price as of January 1, 2025 and does not include additional hedges and short term purchases made within the year. Also reference to @PKY is Parkway delivery point, and @Dawn is Dawn delivery point as required and determined by utility agreements.

2024	Standard Global Adjustment Charge	Actual Global Adjustment Charge	Cost Benefit	Year	Annual Benefit
Jan	$436,575	$176,297	$260,278	2011-2013	$5,171,390
Feb	$569,161	$220,509	$348,652	2014	$2,348,577
Mar	$743,582	$274,015	$469,567	2015	$3,911,299
Apr	$667,913	$223,552	$444,361	2016	$4,682,209
May	$714,090	$239,660	$474,430	2017	$5,976,102
Jun	$695,211	$268,510	$426,701	2018	$6,404,572
Jul	$604,571	$284,295	$320,275	2019	$7,248,037
Aug	$574,737	$261,207	$313,530	2020	$7,397,100
Sep	$706,698	$284,885	$421,813	2021	$3,636,653
Oct	$663,462	$257,767	$405,695	2022	$3,557,985
Nov	$760,538	$314,207	$446,331	2023	$5,208,046
Dec	$564,805	$253,722	$311,083	2024	$4,642,717
Total	$7,701,344	$3,058,627	$4,642,717	**CUMULATIVE**	$60,184,687

Global Adjustment (GA) is one of the rate optimization activities that does contribute to the avoided costs shown in energy strategy KPI section. To be successful as a Class A is avoiding or lowering demand during provincial peak period.

A-25:Top 10 Ontario Verified Peak Demand Days (May 1, 2024-April 30, 2025)

Date	Hour Ending (EST)	ICI Ontario Demand (MWh)
Wednesday, June 19, 2024	17	23,852
Wednesday, July 31, 2024	17	23,356
Thursday, August 1, 2024	17	23,179
Tuesday, June 18, 2024	16	23,097
Tuesday, August 27, 2024	17	22,750
Thursday, June 20, 2024	16	22,486
Monday, August 26, 2024	17	22,466
Tuesday, July 30, 2024	19	22,371
Monday, July 29, 2024	17	22,245
Friday, August 2, 2024	18	22,103

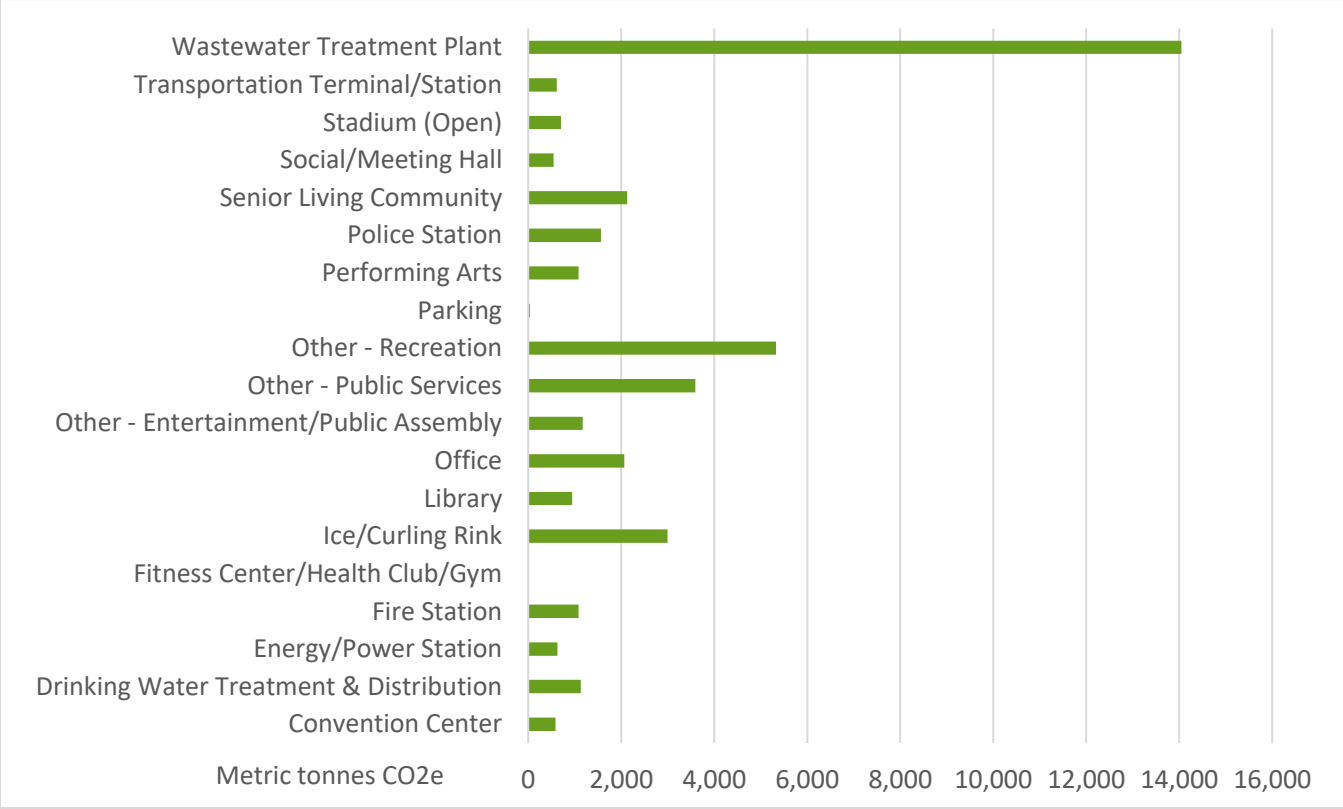
PART 3: GHG EMISSIONS REPORTING

O.REG 25/23: BROADER PUBLIC SECTOR REPORTING[14]

Ontario Regulation 25/23 requires that the City reports for its GHG emissions to the Provincial government by July 1 each year for the previous year. The BPS results may vary from the GHG emissions inventory presented in Part 3 of this report as there are preset categories of facilities which do vary from our reporting sector categories and include only specific (not all) facilities.

The 2024 results are below.

A-26: 2024 GHG Emissions Results Submitted (O. Reg 25/23)



[14] Required to be submitted annually and posted publicly. https://www.hamilton.ca/home-neighbourhood/environmental-stewardship/environmental-plans-strategies/office-energy

B - GLOSSARY

COMMON ACRONYMNS THROUGHOUT THE REPORT

BPS = Broader Public Sector

CAFE = Corporate Average Fuel Economy

CDD = Cooling Degree Days

CDM – Conservation and Demand Management

CESP = Corporate Energy and Sustainability Policy

CNG = Compressed Natural Gas

CO_2 = Carbon Dioxide

CO_2e = Carbon Dioxide equivalent

DLE = Diesel Litre Equivalent

ekWh = equivalent kilowatt hours

EV = Electric Vehicle

GA = Global Adjustment

GHG = Greenhouse Gas

GJ = Gigajoule

HDD = Heating Degree Days

HOEP = Hourly Ontario Electricity Price

HRPI = Hamilton Renewable Power Inc.

ICI = Industrial Conservation Initiative

IESO = Independent Electricity System Operator

KPI = Key Performance Indicator

kW = Kilowatt

kWh = Kilowatt-hour

LED = Light Emitting Diode

m^3 = Cubic Metres

OEB = Ontario Energy Board

PNZ = Pathway to Net Zero

tCO2e = Tonnes Carbon Dioxide equivalent

DEFINITIONS: COMMON TERMS USED THROUGHOUT THE REPORT

Avoided Cost/Cost Avoidance refers to the costs not incurred as a result of some action taken which is outside of status quo.

Commodity Hedging is the process of fixing prices for specific terms for natural gas, fuels or electricity (commodities).

Corporate Energy & Sustainability Policy is the revised and renamed corporate policy (previously the Corporate Energy Policy) governing energy-related decisions for corporately run assets.

Cost Recovery is the value collected by identifying billing errors, billing anomalies or rates corrections that result in a financial adjustment to costs.

Demand Reduction referenced in the report is action taken to reduce electrical demand during forecasted provincial peak events (high demand period) for optimizing Class A customers.

Energy Conservation is the collection of energy efficient measures, equipment or processes that lead to lower consumption.

Energy Intensity is the measurement of energy used per square foot of facility space.

Energy Performance is the collection of performance measurements including consumption, cost and energy intensity as compared against baseline and year over year.

Incentives are monies received from a recognized program including from utility providers, the IESO, Federal or Provincial grant programs where incentives are tied to energy conservation measures.

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 processes and carbon offsetting.

Rate Optimization refers to ensuring that utility accounts are assigned to the appropriate rate class to result in best cost benefit.

Unit Cost is the total price of variable and fixed costs per unit. In this report it refers to unit costs of electricity, natural gas and fuels.

Utility Rates refers to the rate classes identified by local utility providers.