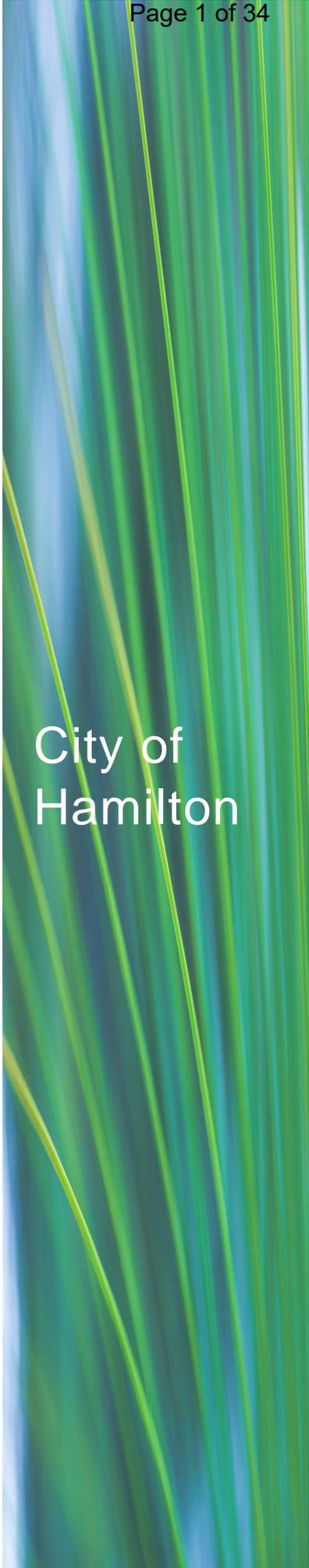


CONSERVATION AND DEMAND MANAGEMENT PLAN 2024

O.Reg 25/23 Broader Public Sector Reporting and Demand
Management Plans



City of
Hamilton

Table of Contents

Section 1: Introduction.....	3
Executive Summary	3
Section 2: Plan Development and Alignment	4
2.1 Regulatory overview	4
2.2 Background.....	4
2.3 Policy Alignment	5
2.3.1 City Council Priorities.....	5
2.3.2 Strategic Plan	5
2.4 Listing of Membership Groups & Partners:	6
2.5 Corporate Energy and Sustainability Policy (CESP):	6
2.6 City Targets.....	7
Section 3: Energy Data	8
3.1 City Profile.....	8
3.2 Energy and Emissions Data.....	9
3.2.1 City Facilities - Usage	9
3.2.2 2018-2023 Conservation Projects.....	11
Section 4: The 2024 Plan	13
Focus Areas of the Plan	13
4.1 Pathway to Net Zero Initiatives	13
4.1.1 Pathway to Net-Zero Projects and Timelines.....	14
4.2 Operational Resiliency	16
4.2.1 Lifecycle Replacement.....	16
4.2.2 On-site Generators and Battery Storage	17
4.2.3 Heat recovery	17
4.3 Low Carbon Fuel Transition	17
4.3.1 Fleet Transition and EV Chargers.....	17
4.3.2 Electrification of Buildings	18
4.3.3 Hydrogen	18
4.4 Renewable Energy Generation	18
4.4.1 Biogas.....	18
4.4.2 Geothermal	19

4.4.3 Solar	19
4.4.4 District Energy	20
4.5 Education and Reporting.....	20
4.5.1 Decarbonization Hub	20
4.5.2 Focus on Transparency	21
4.5.3 Digital Dashboard	21
4.5.4 Citywide Engagement, Community Programs & Policy	21
4.5.5 Climate Action Strategy	21
4.5.6 ReCharge Hamilton	21
4.5.7 Climate Change Impact Adaptation Plan	23
4.5.8 Policies Under Development.....	24
Section 5: Conclusion	24
Appendix A.....	25
Related Energy and Sustainability Strategies, Policies & Initiatives	25
Appendix B.....	26
Pathway to Net Zero Plans	26
Appendix C	27
City of Hamilton Submitted Data.....	27
BPS Data Trend Summary	29
Corporate Energy Use Trends Vs Baseline	29
Corporate Total Energy Consumption by Portfolio.....	31
Corporate Energy Intensity by Year.....	31
Appendix D	32
Definitions.....	32

Section 1: Introduction

The City of Hamilton is committed to decarbonization. In 2021, City Council approved a corporate target of **net-zero emissions by 2050**. This CDM plan covers actions implemented in the past five years and actions to be undertaken city-wide over the next five years to move Hamilton towards net-zero by 2050.

Executive Summary

The City of Hamilton has a long-standing commitment to energy efficiency, conservation, and renewable energy generation. The Office of Energy Initiatives has continuously improved energy efficiency at City facilities since 2006 and renewable energy generation at its two sites since 2006. To track City improvement, the Corporate Energy and Sustainability Policy set energy intensity and Corporate absolute emissions targets against a 2005 baseline. The City's 2019 Conservation and Demand Management 5 Year Plan covering 2019-2023 helped the City reach its 2020 targets ahead of schedule and on track to achieve its 2030 reduction targets.

Within projects identified by the previous CDM plan, the City saw significant electrical consumption reductions through energy efficiency projects, namely LED lighting retrofits across the library, recreation, corporate and yard portfolios. Additional energy and emissions savings were achieved through both ice plant optimization across 6 City-owned arenas and a suite of heat-recovery projects.

The City's 2019 Climate Emergency declaration has increased attention and awareness on the emissions target, revising prior targets to net-zero emissions by 2050. The Office of Climate Change Initiatives (OCCI) was created to manage corporate and community emissions, while the Public Works Climate Lens was implemented to assess the climate change impacts on implementation of capital projects across Public Works.

As part of the City's joint focus on energy efficiency and emissions reduction, the Hamilton Public Library achieved a LEED Gold Certification for its Valley Park Library branch and located its Parkdale branch in a Passive-House-certified apartment complex.

The City also started its Pathway to Net Zero (PNZ) program, conducting net-zero audits/ assessment at 13 high-emitting facilities to identify avenues to achieve net-zero status by the City's 2050 target. The City is working with multiple partners to conduct PNZ audits at additional facilities, with a target rate of five to ten audits per year.

Corporate departments are also integrating energy efficiency and emissions reduction into their day-to-day operations, with projects identified to support decarbonization through life-cycle replacements, the low-carbon fuel transition, renewable energy generation and in support of other operational resiliency and efficiency goals.

By implementing the measures identified in the 2024 Conservation Demand Management Plan, the City of Hamilton expects to achieve its 2030 energy and emissions targets and make significant progress towards its 2050 targets.

Section 2: Plan Development and Alignment

2.1 Regulatory overview

The development of the City of Hamilton's Conservation and Demand Management (CDM) Plan is intended to meet the expectations under O. Reg. 25/23: *Broader Public Sector (BPS): Energy Reporting and Conservation and Demand Management Plans*. It is a strategic five-year 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 in alignment with corporate targets and policies.

2.2 Background

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 Corporate Facilities and Energy 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 was developed in 2009 and further updated to include Sustainability (CESP) in 2020. 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 CESP itself are outlined in section 2.5 below.

In 2019, Hamilton City Council declared a Climate Change Emergency, making it the City of Hamilton's mission to achieve net zero greenhouse gas emissions by 2050 and prepare for the unavoidable impacts of climate change. In August 2022, Hamilton City Council approved the creation of the Office of Climate Change Initiatives (OCCI) to oversee the implementation of Hamilton's Climate Action Strategy (HCAS). HCAS's climate mitigation and adaptation plans are Hamilton's roadmap to drastically cutting carbon emissions to achieve net zero by 2050, while at the same time reducing, preparing, and recovering from the unavoidable impacts of climate change.

There are several actions the City, and broader community, are undertaking to accelerate Hamilton's transition to a prosperous, equitable, resilient post-carbon City. For example, the City's Community Energy and Emissions Plan has specific renewable energy and net-zero targets for municipal buildings. These are just two examples of how advancing municipal climate policy and changing how the City works is central to emissions mitigation, environmental sustainability, and climate resiliency for all.

2.3 Policy Alignment

In addition to complementing the goals of the OEI, CESP, and OCCI the development of this CDM Plan aligns with other initiatives and plans currently in place or underway at the City.

2.3.1 City Council Priorities: The Hamilton City Council approved the following three priorities and eleven outcomes for the 2022-2026 Council term; the CDM plan supports all four key outcomes identified by Council as necessary to achieve sustainable economic and ecological development.



Sustainable Economic & Ecological Development

Reduce the Burden on Residential Tax Payers

Facilitate the Growth of Key Sectors

Accelerate our Response to Climate Change

Protection of Green Spaces and Waterways



Safe & Thriving Neighbourhoods

Increase the Supply of Affordable and Supportive Housing

Make Sure People can Safely and Efficiently Move Around by Foot, Bike, Transit or Car

Provide Vibrant Parks, Recreation and Public Space



Responsiveness and Transparency

Prioritize Customer Service and proactive Communication

Get More People Involved in Decision Making and Problem Solving

Build a High Performing Public Service

Modernize City Systems

2.3.2 Strategic Plan: The City's overall Strategic Plan for 2016-2025 highlights several strategic priorities to support energy conservation and renewable energy generation 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 2016-2025 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. City departments have developed plans, policies, and other resources to help achieve these priorities which will also align with the goal of this CDM plan. See Appendix A for a detailed list and links to the relevant resources.

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.

2.4 Listing of Membership Groups & Partners:

Membership:
FCM Partnership for Climate Change
Clean Air Hamilton
Canadian Biogas Association
Clean Air Council
Carbon Disclosure Project
Global Covenant of Mayors
Sustainable Hamilton Burlington
Blue Dot
Bay Area Climate Change Council
ICLEI Building Adaptive and Resilient Communities Program
Ontario Climate Consortium (until 2021)
Other Partners:
McMaster Thermal Energy Mapping and Campus Energy Management
Mohawk Centre for Climate Change Management
The Atmospheric Fund
CAP
Green Venture
Sustainability Leadership

2.5 Corporate Energy and Sustainability Policy (CESP):

As noted above, the City first developed a [Corporate Energy Policy](#) in 2009. The current iteration of the Policy was amended to include corporate sustainability and approved by Council in 2020. The policy is designed to act as a guideline for making energy and sustainability-related decisions as it pertains to corporate assets. The CESP was

submitted as the original CDM Plan in 2014 in accordance with BPS reporting requirements. 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 CESP support building and process improvements that lead to energy usage reductions and emissions reductions. In addition, the CESP 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 and policies around establishing steering committees, mitigation of energy and fuel consumption, Hamilton Water facilities and Fuels. The policy was mostly recently revised and approved in 2021 and is due for its next revision in 2025.

2.6 City Targets

The specific targets as identified in the CESP and reported on annually are noted below. Targets were revised in 2020 to reflect the City of Hamilton’s net-zero ambitions by 2050. The OCCI has re-baselined the targets relative to 2016 in alignment with science-based targeting best practices, although the revised targets have not yet been approved as part of the CESP.

Table 2.6.1: Corporate Energy Intensity and Emissions Reduction Targets (Base Year 2005)

Year	Energy Intensity Reduction	GHG Emissions Reduction Target
2020	20%	20%
2030	45%	50%
2050	60%	100%

The City of Hamilton proactively achieved its 2020 energy intensity target, reaching a 20% reduction by 2016. The City reached a 35% reduction energy intensity and emissions values in 2020, although values for 2020 and 2021 are not considered representative of standard operational reductions given the impact of the COVID-19 pandemic.

Table 2.6.2: Corporate Energy Performance vs Targets

Year	Energy Intensity (ekWh/sqft)	Energy Reduction (%)	Emissions (t CO2e)	Emissions Reductions (%)
------	------------------------------	----------------------	--------------------	--------------------------

2005	46	-	122,699	-
2018	34	25%	73,638	40%
2023	32	30%	70,271	43%

Section 3: Energy Data

3.1 City Profile

Hamilton is a port city located at the west end of Lake Ontario on the Golden Horseshoe. It has a population of over 569,300. 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 1,100 km² of land. The City manages a diverse portfolio of more than 500 facilities, and they fall into the broad categories of:

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 & 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 Centres	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)
Hamilton Police Services	Includes sites owned not leased

Entertainment venues including First Ontario Centre, First Ontario Concert Hall and Hamilton Convention Centre have been removed from the current CDM scope due to ownership transfer to private owner by City. These properties are not operated by the City and the City does not direct conservation activities at these sites.

3.2 Energy and Emissions Data

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 2023 calendar year. Detailed information can be found within the City of Hamilton’s [Annual Energy Report](#) for 2023 once completed and posted. The Annual Energy Report also contains the City of Hamilton’s Greenhouse Gas Inventory, highlighting corporate scope 1, 2 and select scope 3 emissions.

3.2.1 City Facilities - Usage

In 2023, 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 by HCE Energy Inc. are included within electricity and natural gas, respectively. Natural gas reported below is for buildings only. Natural gas used as a fuel for vehicles is reported separately.

In 2023, Hamilton used 365,390,241 ekWh of combined electricity and natural gas across its corporate facility portfolios. Net energy intensity declined by 30% relative to the 2005 baseline because of ongoing energy conservation efforts, achieving reduction targets for 2020 ahead of schedule and remaining on pace to achieve 2030 targets.

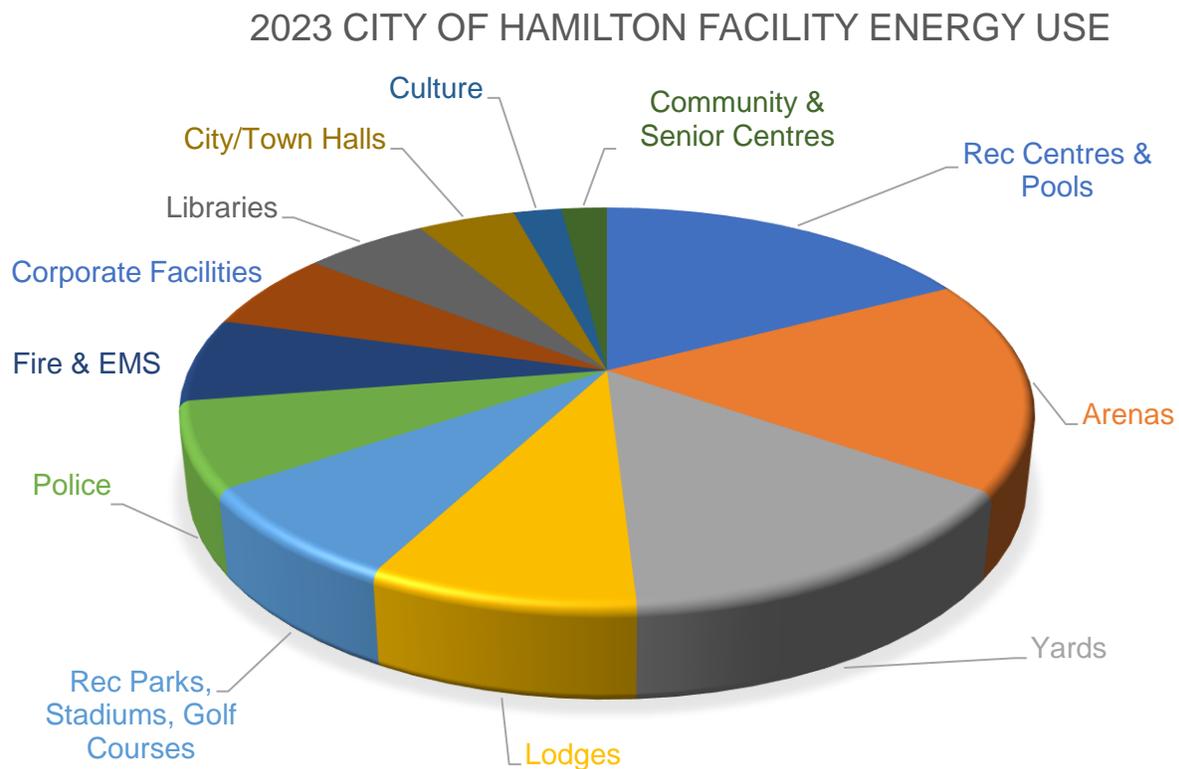
Energy consumption at corporate facilities is primarily driven by occupancy and usage rates and weather. Consumption declined sharply in 2020 and 2021 as occupancy and usage rates dropped due to the COVID-19 pandemic but has increased with a return to normal operations over the past two years. Energy efficiency measures across the portfolio have supported a net 5% decline in energy intensity relative to 2018.

Table 3.2.1: City of Hamilton Facility Energy Use

Total ekWh	2005 Baseline	2018 CDM	2023 CDM
City/Town Halls	1,377,5321	8,706,404	7,569,655
Corporate Facilities	17,187,713	9404499	10,899,520
O&M	44,908,575	28,468,646	22,875,272
Water & Wastewater	121,039,542	126,764,430	171,834,115
Yards	39,589,214	28,503,129	24,601,344
Arenas	39,904,275	36,344,907	29,518,807
Community & Senior Centres	3,834,294	3,536,338	3,535,600
Rec Centres & Pools	26,789,266	25,130,292	29,620,727

Rec Parks, Stadiums, Golf Courses	8,331,597	12,057,438	13,315,462
Lodges	24,937,533	15,133,101	14,861,035
Culture	5,382,733	4,931,697	3,714,667
Fire & EMS	10,697,886	12,814,438	11,565,018
Libraries	9,343,443	11,211,349	9,594,632
Police	14,756,585	8,573,378	11,884,388
Total ekWh	380,477,977	331,580,046	365,390,241

Chart 3.2.1: 2023 City of Hamilton Facility Energy Use



The City of Hamilton also achieved and exceeded its 2020 emissions reduction target of 20% relative to 2005. In 2021, the total Corporate emissions were 70,271 t CO₂e, representing a 43% reduction compared to baseline. Of that total, corporate buildings emitted 20,126 t CO₂e. While 2022 and 2023 corporate emissions have not yet been published, initial 2023 corporate building emissions are estimated at 20,346 t CO₂e. Emissions reductions have been accomplished through a combination of energy efficiency improvements and electrification.

A more detailed view of 2023 energy consumption data will be published in the 2023 Annual Energy Report.

3.2.2 2018-2023 Conservation Projects

A listing of various projects was included in the previous Conservation and Demand Management Plan 2019, and the table below shows the status of those projects that were identified in that plan.

Table 3.2.2: Conservation Projects Initiated and Completed between 2018-2023

Status	Project Name	Project Type	Project Description
Ongoing	Demand Response	Rate Optimization	The City has a Peak Tracking procedure where staff monitor daily IESO demand and notify building operators and Water staff to anticipate peak electrical demand periods to allow them to make operational changes.
Ongoing	Energy Procurement	Rate Optimization	The City adheres to specific policies outlining procurement best practices which cover low carbon fuel and renewable energy procurement in addition to standard energy contract management.
Complete	Valley Park LEED Renovation	Energy Efficiency Retrofit	Renovated Valley Park Library and Community Centre to LEED Gold certification standard, including on-site renewables
Complete	Parkdale Library Passive House	Energy Efficiency Retrofit	Parkdale Library branch installed as anchor tenant in 50-unit affordable housing built to Passive House standard
Complete	Library LED Lighting Retrofits	Energy Efficiency Retrofit	Retrofit lighting across all branches with LED lighting
Complete	Central Library Window replacement	Energy Efficiency Retrofit	Replaced windows at Central Library with Low-E glass
Complete	Westmount Solar Thermal & Pool Waste Heat Recovery	Energy Recovery Retrofit	Installation of new solar thermal & heat recovery systems including make-up water controls
Complete	Recreation Facilities LED Lighting	Energy Efficiency Retrofit	Installation of LED lighting and controls at 35 Recreation facilities

Complete	Arenas Ice Plant Optimization		Installation of floating heat pressure controls at 6 arenas
Complete	Stoney Creek Recreation Centre Pool Waste Heat Recovery Project	Energy Recovery Retrofit	Installation of thermal heat recovery systems at Stoney Creek Rec Centre Pool
Complete	Stoney Creek City Hall Cooling Tower Lifecycle Replacement		End-of-life replacement of cooling tower at Stoney Creek City Hall/RCMP detachment
Complete	Wentworth Operations Centre LED Retrofit Stage 1		Retrofit Wentworth Operations Centre with LED lighting (interior and exterior)
Complete	Hamilton City Hall LED Lighting Retrofits		Retrofit Hamilton City Hall with LED lighting (interior and exterior)
Complete	RTU Replacement at Fire Admin & Fire Station 4		Replace 6 RTUs and Make-Up Air Unit at Fire Admin Building and Fire Station 4
Complete	Wentworth Operation Centre LED Retrofit Stage 2		Finish retrofitting lighting at Wentworth Operations Centre with LED lighting (internal & external)
In Progress	Bennetto Grey Water Heat Recovery	Energy Recovery Retrofit	Recover waste heat from grey water at Bennetto Recreation Centre
In Progress	Kanétskare Grey Water Heat Recovery	Energy Recovery Retrofit	Recover waste heat from grey water at Kanétskare Recreation Centre
In Progress	Jimmy Thompson Pool VFD		Install variable frequency drives on filters at Jimmy Thompson Pool
In Progress	Central Composting Facility LED Lighting		Retrofit Central Composting Facility with LED lighting
In Progress	Morgan Firestone Arena Solar PV	Renewable Energy Generation	Install 265-kW Solar PV System at Morgan Firestone Arena
In Progress	Harry Howell Arena Solar PV	Renewable Energy Generation	Install 250-kW Solar PV System at Harry Howell Arena
Complete	City Hall EV Charger Installation	Electrification and Fuel	Install 9 EV chargers for corporate fleet use at City Hall

		Switching Project	
In Progress	Wentworth Operations Centre EV Charger Installation	Electrification and Fuel Switching Project	Install 11 EV chargers for corporate fleet use at Wentworth Operations Centre
In Progress	Work Yards EV Charger Installations	Electrification and Fuel Switching Project	Install 25 EV chargers for corporate fleet use at 11 work yards
In Progress	Macassa Lodge Boiler Upgrades		Upgrade boilers at Macassa Lodge with energy-efficient condensing boilers
In Progress	Wentworth Operations Centre Heater Upgrades		Upgrade end-of-life bay heater units with energy-efficient replacements
In Progress	Wentworth Operations Centre Solar Thermal Upgrade		Install Solar Thermal Domestic Hot Water System

Section 4: The 2024 Plan

Focus Areas of the Plan

There are five key focus areas of the plan that will help the City achieve its targets. The broad focus areas are *Pathway to Net Zero* Initiatives, Operational Resiliency, Low Carbon Fuel Transition, Renewable Energy, and Education and Reporting.

4.1 Pathway to Net Zero Initiatives

To meet its net-zero goals, the City of Hamilton engaged an external consultant to prepare a portfolio-scale Net Zero Carbon Plan (“Pathway to Net Zero for Corporate Buildings” or PNZ) to provide recommendation and direction for actions necessary to achieve net-zero carbon across the City’s corporate facility portfolio in alignment with the City’s net-zero 2050 objective. The initial portfolio is expected to emit ~18,000 t eCO₂ annually in 2050 if no carbon reduction measures are applied. Measures identified for implementation within the CDM period are expected to reduce net emissions by 2,130 t CO₂e annually by 2028. The pathway includes four tiers of measures (all percentages based on 2050 Annual Emissions Reduction):

Tier 1: Scheduled Load Reductions – 20%

Enclosure improvements (and other select load reductions measures) in alignment with replacement schedules already planned by the City (at equipment and component end of life).

+Tier 2: Scheduled Load Reductions with Mechanical Measures – 72%

Rescheduling of mechanical equipment replacements to align with the enclosure improvements: creating more comprehensive retrofit project opportunities. Mechanical measures focus heavily on electrification, in addition to efficiency.

+Tier 3: Additional Electrification – 88%

Identification of additional electrification measures beyond mechanical system replacements already scheduled. After Tier 3 measures are applied this portfolio will be nearly all-electric (low carbon).

+Tier 4: Offsets – 100%

Application of existing City waste gas capture (“renewable” natural gas) to offset remaining emissions.

The City developed 10 site-specific Pathway to Net-Zero plans in 2021 and a further 3 in 2022, focusing on the highest-emitting portfolios, namely Arenas, Pools, and Lodges. By focusing on specific portfolios, the City is streamlining the planning process to ensure identified measures can be applied to similar facilities within the portfolio. Going forward, the City plans to add five to ten site-specific PNZ plans per year, prioritized by emissions’ impact and alignment with existing plans.

4.1.1 Pathway to Net-Zero Projects and Timelines

Below is a summary of projects identified by the existing PNZ plans along with current timelines. Projects identified below are contingent on feasibility studies, Council approval and budgetary funding approval. While projects are identified by their emissions-reduction impact, most projects are expected to have associated energy reductions.

Table 4.1.1: Pathway to Net Zero Projected Project Costs 2023-2027

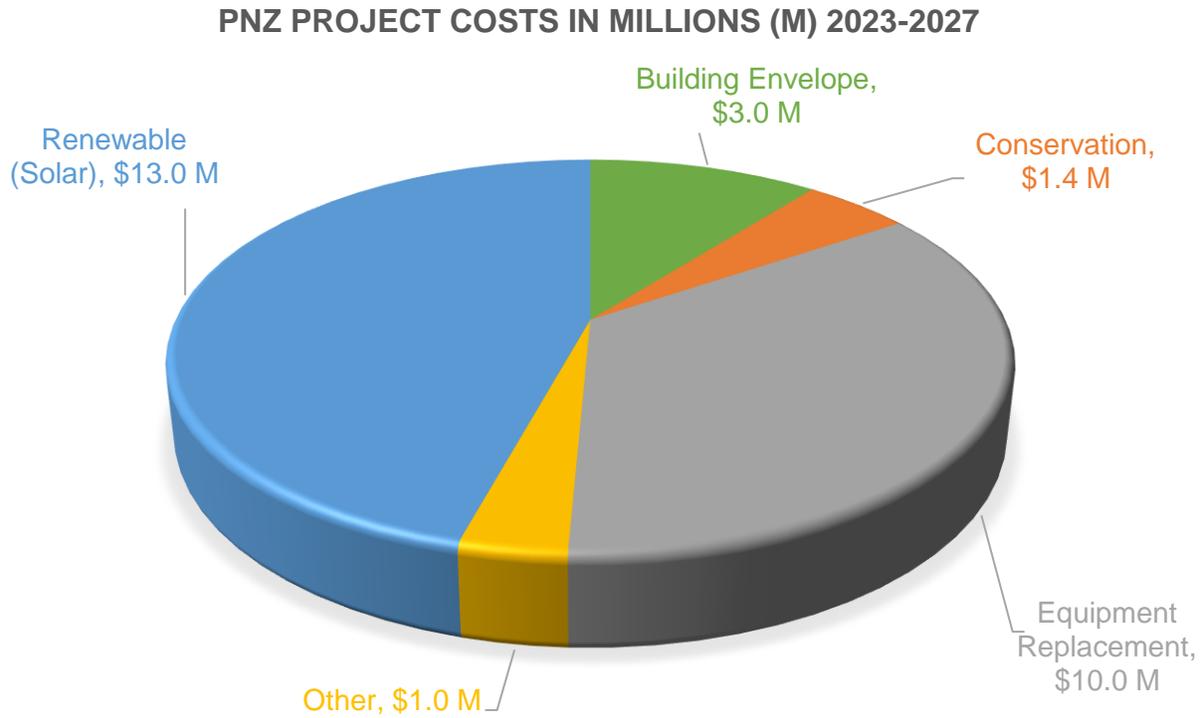


Table 4.1.2: Pathway to Net Zero Project Timeline

Project Start Year	Project Type	Portfolio(s)	# of Projects	Emissions Savings (t CO2e)	Estimated Capital Cost (\$)
2023	Solar PV Installation	Arenas	1	26.6	\$1.8 M
	Heating Retrofits	Yards	1	23.2	
	Waste Heat Recovery	Rec Centres	2	19.6	
	LED Retrofits	Corporate, Yards, Fire	5	10.4	
	VFD Upgrades	Indoor Pools	1	1	
2024	Building Envelope Improvements	Yards	1	86.9	\$7.3 M
	Condensing Boiler Retrofits	Lodges	2	85.7	
	Solar Heating and Heating Electrification	Arenas, Rec Centres	3	76.5	
	Waste Heat Recovery	Lodges, Rec Centres	3	62.8	
	Solar PV Installation	Arenas, Rec Centres	3	37.2	
	Low-flow Water Installations	Arenas, Indoor Pools, Rec Centres	5	18.9	

	LED Retrofits	Yards	1	2.4	
2025	Solar PV Installation	Rec Centres, Yards	3	30.8	\$8.2 M
	Solar Heating and Heating Electrification	Arenas, Lodges, Rec Centres, Yards	10	279	
	Ground-source heat pump	Arenas	1	189.7	
	Waste Heat Recovery	Lodges, Yards	2	54.5	
	VFD Upgrades	Rec Centres	1	6.7	
	Building Envelope Improvements	Yards	1	4.2	
2026	Solar PV Installation	Fire	1	8.7	\$5.4 M
	Solar Heating and Heating Electrification	Fire, Rec Centres	6	241.6	
	Waste Heat Recovery	Yards	1	465.3	
2027	Solar PV Installation	Rec Centres, Yards	2	45.1	\$5.7 M
	Solar Heating and Heating Electrification	Indoor Pools	3	264.1	
	Building Envelope Improvements	Corporate, Yards	3	88.9	
Total			62	2,130	\$28.4 M

The City is currently working on the next phase embarking on five additional plans for the Pathway to Net Zero. New conservation and demand management activities with energy and emissions reductions will be added to the PNZ action list as more site plans are completed and activities identified.

4.2 Operational Resiliency

The Public Works team runs all projects through a Climate Lens tool to evaluate their climate mitigation and adaptation impact to drive retrofit decisions Asset management activities and capital projects without a specific energy efficiency or conservation goal which nonetheless contribute towards energy efficiency improvement and emissions reductions have been identified below.

4.2.1 Lifecycle Replacement

Through the standard lifecycle replacement process, the City of Hamilton has identified opportunities to replace aging equipment at the end of its lifecycle with more energy-efficient alternatives. This includes but is not limited to projects identified within the Pathway to Net Zero process where projects occur at assessed facilities, where the projects will result in carbon emissions reductions, and where the lifecycle replacement is expected to occur within the targeted timeframe.

Efficiency improvements associated with lifecycle replacements are not limited to corporate facilities. Environmental Services and Transportation are engaged in ongoing programs to convert park lighting, decorative lighting, and streetlighting to LED or solar

lighting as existing lights reach their end-of-life. Both departments also have strategies to decarbonize park and roadway maintenance tools through electric lifecycle replacements.

4.2.2 On-site Generators and Battery Storage

Climate impact assessments are being integrated into corporate asset management plans on an asset-by-asset basis. These assessments have identified the risk of energy services disruptions resulting from climatic events impacting either the local distribution grid or broader provincial power grid as a key risk to City operations and operational resiliency. The City currently has 36 diesel backup generators and one battery storage system to minimize the risk of power disruptions across key facilities within its portfolio. City is also exploring and developing a methodology for assessing switching these generators to low carbon fuel types.

Battery energy storage systems (BESS) can also provide financial benefits in addition to back-up capabilities. The City has investigated and continues to investigate opportunities to use on-site batteries for monthly demand management and global adjustment peak avoidance. As battery costs continue to decline, BESS may become a more attractive investment for the City's Class A facilities.

4.2.3 Heat recovery

Most City facilities solely use natural gas heat for climate control, primarily during the winter months. Where facilities also use it for elements of their day-to-day operations, the City is investigating ways to implement heat recovery, improving the energy efficiency of existing equipment and potentially reducing cooling requirements associated with removing waste heat.

The Pathway to Net Zero plans have identified seven waste-heat recovery projects within the portfolio. Projects identified fit within three categories: pool waste heat recovery control systems, laundry and shower wastewater heat recovery, and make-up air heat recovery units.

The city will also explore sewer thermal energy utilization opportunities within its vast sewer network working with partners in coming years.

4.3 Low Carbon Fuel Transition

4.3.1 Fleet Transition and EV Chargers

Working with a consultant, the City of Hamilton has developed a Green Fleet Strategy and Report to reduce corporate fleet emissions. The Strategy identified three groups of solutions:

- Group One: Lifecycle optimization and best management practices (BMPs) or "house-in-order" strategies
- Group Two: Fuel switching or "messy middle" – interim, present-day solutions including renewable fuels (E85 ethanol, B10 biodiesel, RNG) and alternate fuels (CNG and LPG)
- Group Three: Battery-electric vehicle (BEV) technology

As part of the strategy, the City has purchased 24 light-duty fully electric vehicles, 47 level 2 chargers and 2 level 3 charging stations, implemented an anti-idle campaign, purchased biodiesel, and provided over 350 drivers with EcoDrive training annually. The current projects implemented have reduced corporate fleet emissions by an estimated 5,027 t CO₂e annually.

Within the next five years, the City intends to purchase Compressed Natural Gas waste compactors, electric golf carts, electric street sweepers, and an electric snow compactor along with further BEV light duty vehicles and install up to 150 total corporate EV chargers. Refer to the Green Fleet Strategy document for additional detail.

Within the Recreation portfolio, the City has identified opportunities to electrify ice resurfacers. Converting ice resurfacers is expected to reduce corporate emissions by 31 t CO₂e per resurfacer.

4.3.2 Electrification of Buildings

Natural gas consumption is responsible for 55% of total City emissions and 75% of corporate facility emissions. Natural gas is primarily used across all portfolios through HVAC and hot water systems. To reach net-zero goals, the City has identified high-emitting facilities across its portfolios and, within those facilities, key natural gas equipment which can be electrified.

While electrification may in some cases increase net energy consumption, it directly reduces scope 1 emissions. As renewable energy and zero-carbon electricity production increases both at the facility and grid level, scope 2 emissions are also expected to decline sharply. Identified Electrification opportunities include air and ground-source heat pumps, radiant electric heating, electric boilers, and domestic hot water tanks. See the Pathway to Net Zero section for a list of upcoming electrification projects. As Pathway to Net Zero plans are created for more facilities, more electrification opportunities will be identified and implemented.

4.3.3 Hydrogen

ReCharge Hamilton includes plans to decarbonize heating within the City by 2050 through the adoption of green hydrogen as a replacement for residual natural gas demand that cannot be offset through electrification or renewable natural gas. Technical analysis is required to identify use-cases for green hydrogen and associated technical requirements to transport green hydrogen to end-users throughout the City. Shared hydrogen infrastructure development is also expected to be a potential focus item of the decarbonization hub.

4.4 Renewable Energy Generation

4.4.1 Biogas

Existing renewable generation operations for the City are managed through Hamilton Renewable Power Inc. (HRP Inc). HRP Inc 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 source 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 HRP Inc 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 processes of the wastewater treatment process. The raw biogas is purified, treated, and conditioned to yield utility grade renewable natural gas that can be injected into the natural gas distribution system.

HRP Inc. will engage a consultant to assess the implementation of generating more RNG at both sites in the coming years.

In addition to producing biogas for cogeneration and sale, the City also purchased renewable natural gas (RNG) in conjunction with Enbridge as a pilot project to decarbonize part of the compressed natural gas (CNG) bus fleet. Starting in 2025, the City has plans to incrementally purchase more RNG each year to decarbonize existing natural gas demand, with a target of decarbonizing 100% of remaining natural gas demand after electrification by 2050.

4.4.2 Geothermal

The Discovery Centre is equipped with an estimated 55-t geo-exchange, ground-source heat pump loop. The geothermal system is expected to continue providing renewable heating and cooling to the facility as it is renovated to become a new library branch and community space.

4.4.3 Solar

As part of its commitment to decarbonizing the local community, the City has set targets to cover 50% of municipal buildings with rooftop solar PV covering at least 30% of each building's load by 2050. The City is also planning to add 280 MW of ground-mount solar within City limits by 2050.

The City of Hamilton currently leases roof space to Alectra Utilities for a 250-kW rooftop solar PV installation at the Wentworth Operations Centre. 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 and has located its Parkdale Branch in a Passive House-certified apartment complex powered in part by a 30-kW rooftop solar PV system.

The Pathway to Net Zero has identified 10 solar PV installation opportunities within the next five years, with two of the identified projects at Harry Howell Arena and Morgan Firestone Arena currently in progress. The PNZ has also identified three further solar heating opportunities within the Recreation portfolio.

Hamilton Water is undertaking a feasibility study to identify suitable solar PV sites to be completed by the end of 2024. City will explore various alternate delivery models to implement identified solar renewable energy generation projects.

Table 4.4.3: Identified Solar PV Projects

Status	Location	System Size (kW)
Existing	Wentworth Operations Centre	250 kW
Existing	Valley Park Community Centre	30 kW
Under Construction	Morgan Firestone Arena	265 kW
Under Construction	Harry Howell Arena	250 kW
Identified	Bennetto Rec Centre	20 kW
Identified	Traffic Operations Centre	375 kW
Identified	Stoney Creek Rec Centre	20 kW
Identified	Fire Station 5 Complex	150 kW
Identified	Wentworth Operations Centre	1,000 kW
Identified	Kanétskare Rec Centre	60 kW
Feasibility	Hamilton Water Feasibility Study	n/a
Feasibility	New Hamilton Transit Facility	n/a
Total		2,140 kW

4.4.4 District Energy

Hamilton Community Enterprises (HCE) is a wholly owned subsidiary of the City of Hamilton providing district heating, cooling and distributed electricity to a few City facilities using centrally located cogeneration, boilers, condensers, and chillers. HCE produced 14,189 MWh of cooling and 24,035 MWh of heat in 2023. As the Decarbonization Hub develops, there may be opportunities to expand the district energy system to include industrial residual heat to displace natural gas heating.

4.5 Education and Reporting

4.5.1 Decarbonization Hub

The City of Hamilton has approved the creation of the Hamilton Region Decarbonization Hub. Once funded, the Hub will support a coalition of governmental, commercial, and industrial partners working together to turn Hamilton into one of the world’s first net-zero emissions cities. The Hub will take a regional approach to emissions reductions, bridging the gap between sectors to identify cross-sector and cross-industry activities which can address emissions.

This collaborative approach is expected to share technical research and development costs for large-scale projects, allowing the Hamilton area to develop new net-zero value chains and business models. While the focus is on decarbonizing the broader community and industrial partners, the municipality will be involved in both facilitating and, where applicable, participating in net-zero projects.

4.5.2 Focus on Transparency

Reporting of accurate data is imperative to enhance the decision-making process and to identify areas where energy usage and emissions can be reduced effectively. The City reports to several governing bodies such as its annual energy usage for corporate buildings through O. Reg 25/23. Additionally, the City's Annual Energy Report captures data for several different key performance metrics, including costs and generated savings. The Office of Climate Change Initiatives reports on community-based emissions. Data is available to the public and an annual report on its activities is presented to the General Issues committee each year and the report is available to the public.

4.5.3 Digital Dashboard

The City of Hamilton is committed to being an open, transparent, and accessible government. [Open Hamilton](#) enables our community the opportunity to better explore, visualize and download City data. The City makes Corporate and community emissions data available to the public using the Open Hamilton platform and will investigate including Energy data.

4.5.4 Citywide Engagement, Community Programs & Policy

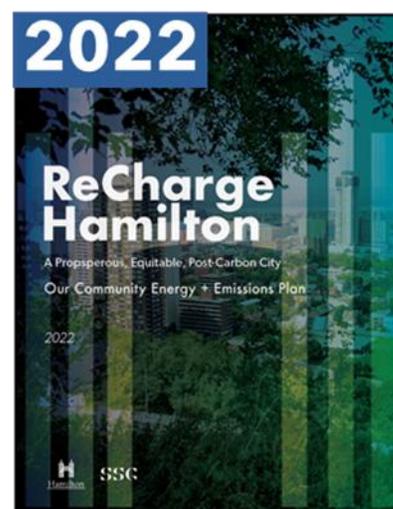
In addition to the work of the decarbonization hub, the Office of Climate Change Initiatives is leading efforts to accelerate the City of Hamilton's transition to a prosperous, equitable, resilient post-carbon community.

4.5.5 Climate Action Strategy

The [Hamilton Climate Action Strategy](#) guides the City's municipal climate policy to ensure the City and broader community can mitigate and adapt to the impacts of climate change. Mitigation lessens the rate and severity of climate change through the reduction of greenhouse gases. Adaptation prepares for unavoidable climate change events to decrease their impacts. Mitigation is primarily addressed through the Community Energy and Emissions Plan, while adaptation is primarily addressed through the Climate Change Impact Adaptation Plan

4.5.6 ReCharge Hamilton

[ReCharge Hamilton](#) is Hamilton's 2022 Community Energy and Emissions Plan to improve energy efficiency, reduce GHG emissions and support local sustainable and community-supported energy



solutions. The plan outlines five transformations which can be implemented to achieve Hamilton’s ambitious low-carbon future:

5 Low-Carbon Transformations



Within the plan, the OCCI identified the following 12 targets and 9 actions which will guide decarbonization within City operations directly, in addition to supporting the community.

Transformation	Low-Carbon Scenario Targets	Actions
Transforming Our Buildings	<ol style="list-style-type: none"> 1) By 2050, all new municipal buildings achieve net-zero emissions * 2) By 2050, all municipal buildings are retrofitted to achieve 50% energy efficiency relative to 2016 	<ol style="list-style-type: none"> 1) Develop and integrate City-wide new green development standards (this should include municipal buildings but currently does not) 2) Install solar PV on new and existing buildings.
Changing How We Move	<ol style="list-style-type: none"> 3) 100% of new municipal small and light-duty vehicles are electric by 2040 4) 100% of new municipal heavy-duty vehicles switch to clean hydrogen by 2040 5) Decarbonize the transit fleet by 2035 	<ol style="list-style-type: none"> 3) Decarbonize the bus fleet. 4) Establish then implement a city-wide EV Strategy (residential, commercial, and municipal).

<p>Revolutionizing Renewables</p>	<ul style="list-style-type: none"> 6) In 2050, for each MWh of central electricity demand remaining after local renewable energy production, purchase a Renewable Energy Certificate (REC). (This action includes the modelled wind capacity) 7) In order to replace the remaining natural gas in the City, green hydrogen (produced via renewable energy) is pumped into the natural gas distribution system 8) By 2050, installation of 280 MW of ground mount solar PV, inside or outside the City boundary 9) Expansion of the downtown district energy network powered by industrial residual heat 10) By 2050, 50% of municipal buildings will add rooftop solar PV, covering 30% of the buildings electric load 11) By 2050, 95% of organic waste is sent to anaerobic digestion for local energy use 12) Purchase remaining RNG needed to replace all remaining natural gas demand by 2050, starting in 2025 	<ul style="list-style-type: none"> 5) Implement strategic renewable solar energy installations. 6) Technical feasibility study of expanded anaerobic digestion facilities. 7) Technical analysis of green hydrogen potential, costs, as well as actions to increase green hydrogen deployment in the City through the creation of a hydrogen hub. 8) Decarbonize and expand HCE downtown district energy system. 9) Technical + financial analysis for expanded organics collection and diversion.
--	---	---

4.5.7 Climate Change Impact Adaptation Plan

The [Hamilton Climate Change Impact Adaptation Plan](#) focuses on four theme areas with objectives, actions and supporting actions to achieve a more resilient future for the City and broader community. These resilient themes are:

- 1) Built Environment
- 2) People and Health
- 3) Natural Environment, Agriculture and Water
- 4) Energy and Economy

While the focus of the plan is on the broader community, there are three action items which will impact conservation and sustainability efforts within City operations:

Resilient Theme	Actions
<p>People and Health</p>	<p>10) Explore opportunities to expand current cooling & warming centre programming and interventions.</p>
<p>Energy and Emissions</p>	<p>11) Work with local partners to conduct vulnerability and risk assessments on local energy systems and identify opportunities to increase local energy generation</p>

	<p>(e.g. microgrids) to increase reliability (potentially as part of CEEP action identifying renewable energy generation sites within the City)</p> <p>12) Establish low-carbon back-up power systems in all City-owned facilities to serve as community hubs during emergencies and create a policy to support and promote the use of low-or-no-carbon emergency energy supplies.</p>
--	--

4.5.8 Policies Under Development

In addition to and in support of the community plans listed above, the OCCI is developing additional policies which will drive emissions reductions within City operations and the local community. Policies currently under development which may be implemented within the CDM period include:

- 1) Carbon Budgeting and Accounting Framework
- 2) Net-Zero Policy for New Corporate Buildings

Currently, the OCCI is also providing detailed feedback to the City's Planning and Economic Development department for Green Building Standards under development.

Section 5: 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 identifying and implementing energy efficiency or GHG-reducing projects, renewable energy generation projects, updating relevant policies to better align corporate activities to targets, and increasing engagement corporately and with the community.

Focusing on education and capacity building across the City departments and divisions will also be a focus area for coming years. Developing good financial and technical business case for projects, robust measurement and verification process for energy/ GHG savings quantification, production of case studies and success stories within City and across industry will continue.

Appendix A

Related Energy and Sustainability Strategies, Policies & Initiatives

- Hamilton Climate Action Strategy
 - ReCharge Hamilton - Community Energy and Emissions Plan
 - Climate Change Impact Adaptation Plan
- Corporate Energy and Sustainability Policy
- Green Fleet Strategy
- Decarbonization Hub
- Hamilton Public Library Sustainability Plan
- Public Works Climate Lens
- Parks Master Plan
- Biodiversity Action Plan
- Urban Forest Strategy
- Transportation Level 3 City Vehicle Usage Monitoring
- Pathway to Net-Zero
- CityHousing Hamilton's High-Performance Passive House Buildings
- Annual Energy Report
- Annual GHG Inventory

Appendix B

Pathway to Net Zero Plans

Facility	Portfolio	Plan Status
Chedoke Twin Pad Arena	Arena	Complete
Harry Howell Arena	Arena	Complete
Morgan Firestone Arena	Arena	Complete
Inch Park Arena	Arena	Complete
Kanétskare Recreation Centre	Rec Centre	Complete
Stoney Creek Recreation Centre Pool	Rec Centre - Indoor Pool	Complete
Bennetto Recreation Centre Pool	Rec Centre – Indoor Pool	Complete
Westmount Recreation Centre Pool	Rec Centre – Indoor Pool	Complete
Jimmy Thompson Pool	Indoor Pool	Complete
Fire Complex 5	Fire	Complete
Mountain Transit Centre	Yard	Complete
Traffic Operations Centre	Yard	Complete
Wentworth Operations Centre	Yard	Complete
Macassa Lodge (HVAC Only)	Lodge	Complete
Dundas Town Hall	Corporate	Complete
Discovery Centre	Library	Complete
Central Library	Library	Complete

Appendix C

City of Hamilton Submitted Data

[2022 BPS Report Summary](#)

Facility Classification	Property GFA (m ²)	Electricity Use - Grid Purchase (kWh)	Natural Gas Use (GJ)	Energy Use (GJ)	Energy Use Intensity (GJ/ m ²)	Total GHG Emissions (t CO ₂ e)	GHG Intensity (t CO ₂ e/ m ²)
Convention Center	11,622	2,098,978	0	20,411	1.76	791	0.07
Drinking Water Treatment & Distribution*	0	29,036,909	2,944	107,476	n/a	961	n/a
Energy/Power Station	1,601	2,834,679	29	10,233	6.39	81	0.05
Fire Station	24,574	3,470,045	21,352	34,232	1.39	1,194	0.05
Fitness Center/Health Club/Gym	2,143	297,877	0	1,072	0.50	8	0.00
Ice/Curling Rink	65,877	10,532,302	51,354	90,335	1.37	2,942	0.04
Library	36,832	5,509,595	7,829	39,628	1.08	1,090	0.03
Office	57,809	6,117,864	19,135	61,459	1.06	2,405	0.04
Other - Entertainment/Public Assembly	56,318	8,002,620	6,440	51,032	0.91	1,779	0.03
Other - Public Services	106,356	11,327,214	66,736	108,398	1.02	3,727	0.04
Other - Recreation	64,360	11,592,530	94,901	136,634	2.12	5,096	0.08
Parking	48,468	1,187,869	0	4,276	0.09	33	0.00
Performing Arts	8,712	1,943,075	1,091	20,688	2.37	889	0.10
Police Station	27,220	5,149,893	19,416	44,431	1.63	1,478	0.05
Senior Living Community	32,263	5,275,724	31,245	50,238	1.56	1,719	0.05
Social/Meeting Hall	21,938	1,932,065	12,850	19,913	0.91	707	0.03
Stadium (Open)	30,393	6,046,321	10,511	32,277	1.06	698	0.02
Transportation Terminal/Station	26,584	3,470,973	15,753	28,253	1.06	890	0.03
Wastewater Treatment Plant*	23,597	69,634,712	212,080	462,763	19.61	12,612	0.53
Total	646,667	185,461,242	573,665	1,323,750	2.05	39,098	0.06
Total excl. Water	623,070	86,789,622	358,641	753,512	1.21	25,525	0.04

[Facility-level data is published on the City of Hamilton website](#)

[2023 BPS Report Summary](#)

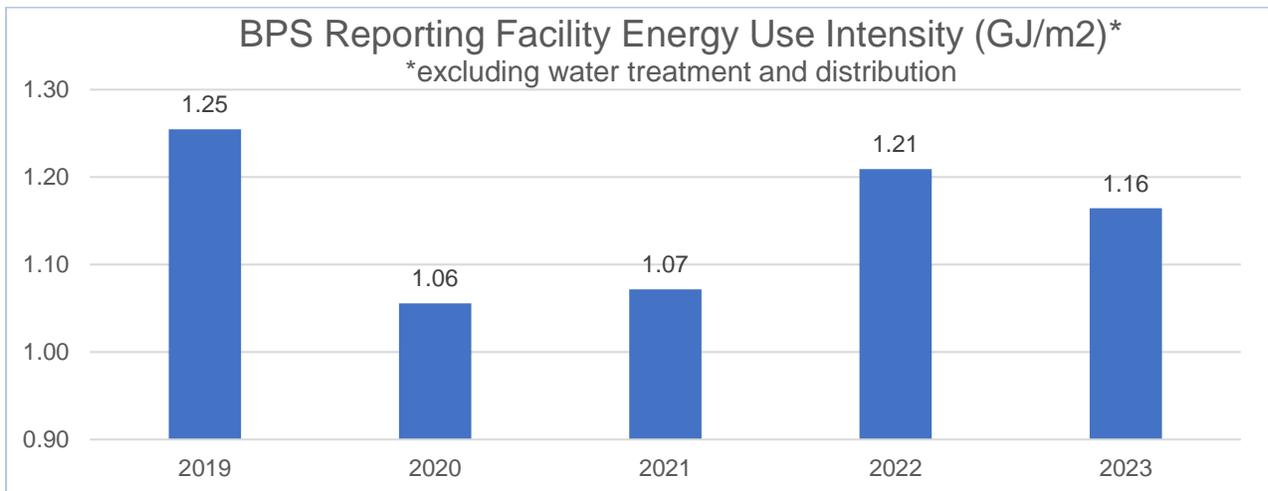
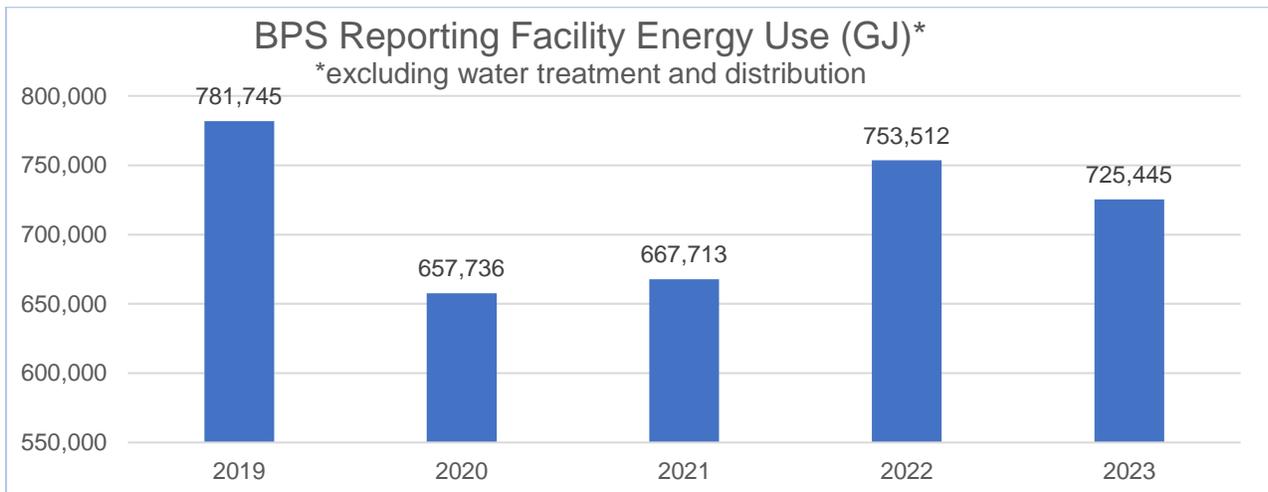
Facility Classification	Property GFA (m ²)	Electricity Use - Grid Purchase (kWh)	Natural Gas Use (GJ)	Energy Use (GJ)	Energy Use Intensity (GJ/ m ²)	Total GHG Emissions (t CO ₂ e)	GHG Intensity (t CO ₂ e/ m ²)
Convention Center	11,622	2,160,860	0	19,821	1.71	715	0.06
Drinking Water Treatment & Distribution*	0	28,684,200	2,245	105,507	n/a	916	n/a
Energy/Power Station	1,601	3,192,260	28	62,926	7.20	91	0.06
Fire Station	24,574	3,365,261	20,109	32,487	1.32	1,122	0.05
Fitness Center/Health Club/Gym	2,143	279,683	0	1,007	0.47	8	0.00
Ice/Curling Rink	65,877	11,613,494	50,372	93,282	1.42	2,925	0.04
Library	36,832	5,357,261	6,852	36,665	1.00	925	0.03
Office	57,809	6,183,940	17,150	57,039	0.99	2,088	0.04
Other - Entertainment/Public Assembly	56,318	6,755,397	5,947	44,301	0.79	1,590	0.03
Other - Public Services	106,356	10,876,726	57,912	97,931	0.92	3,267	0.03
Other - Recreation	64,360	11,995,175	92,666	135,848	2.11	4,995	0.08
Parking	48,468	1,090,743	0	3,927	0.08	31	0.00
Performing Arts	8,712	1,664,507	1,189	19,312	2.22	907	0.10
Police Station	27,220	4,961,364	19,428	43,573	1.60	1,463	0.05
Senior Living Community	32,263	5,176,507	35,925	54,560	1.69	1,951	0.06
Social/Meeting Hall	21,938	2,050,592	11,489	19,085	0.87	648	0.03
Stadium (Open)	30,393	5,461,649	10,244	29,905	0.98	668	0.02
Transportation Terminal/Station	26,584	3,619,832	12,152	25,183	0.95	712	0.03
Wastewater Treatment Plant*	23,597	71,753,368	226,111	484,421	20.53	13,377	0.57
Total	646,667	186,242,819	569,818	1,315,373	2.03	38,397	0.06
Total excl. Water	623,070	85,805,251	341,462	725,445	1.16	24,104	0.04

[Facility-level data is published on the City of Hamilton website](#)

BPS Data Trend Summary

Energy Use and Emissions, BPS Facilities Excluding Water

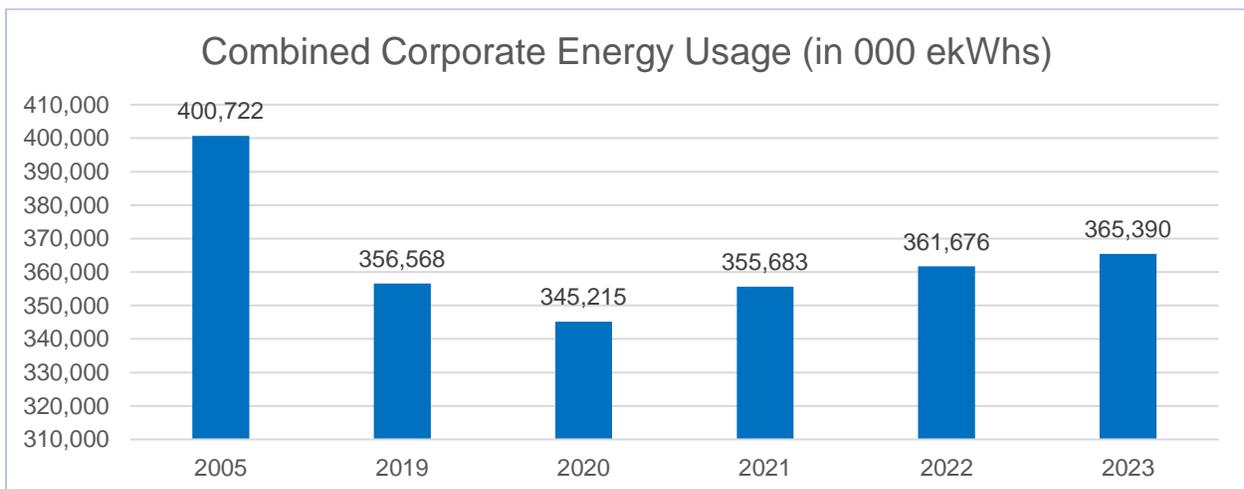
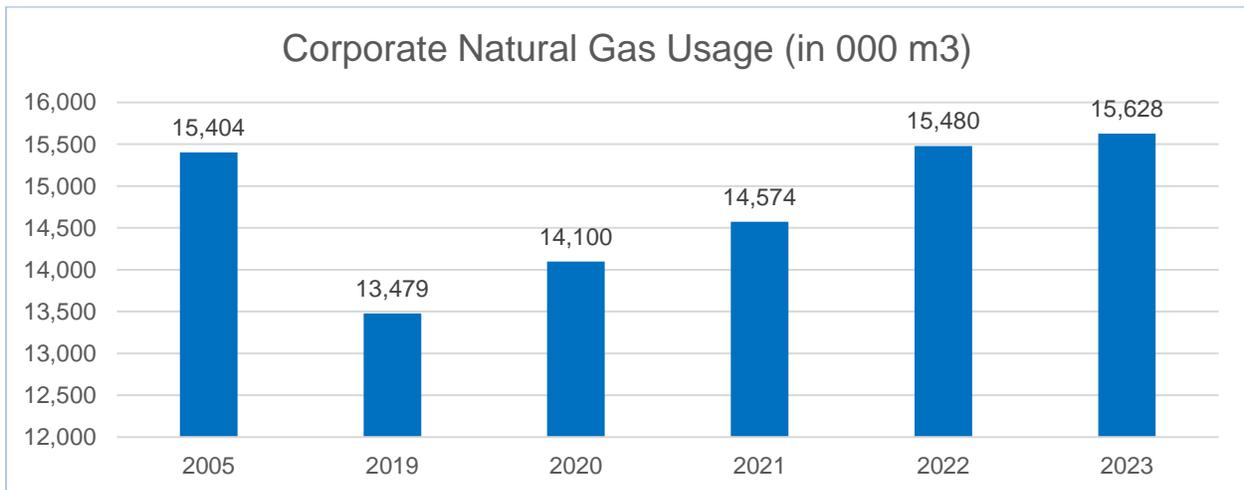
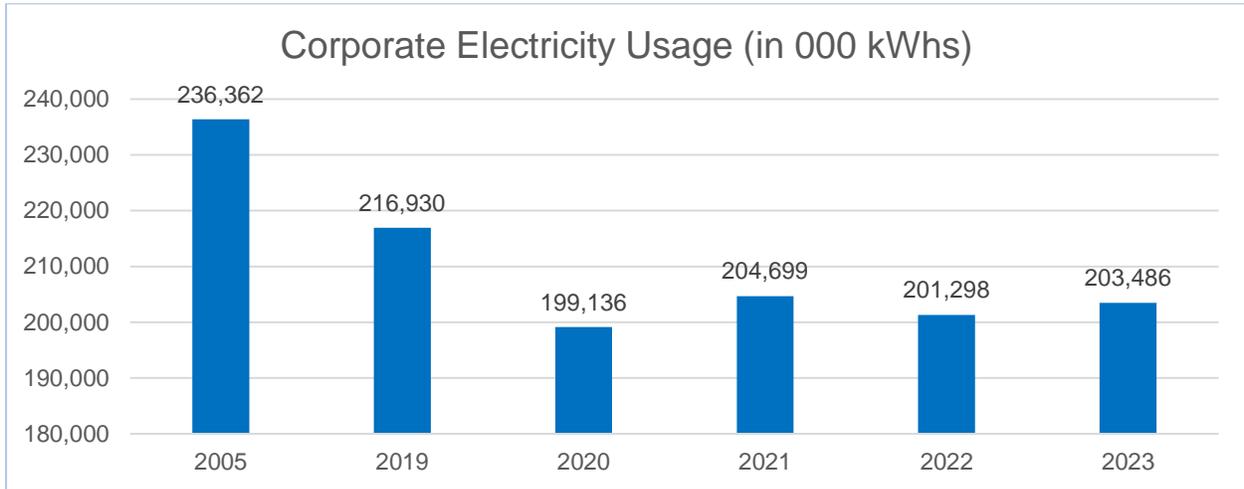
	2019	2020	2021	2022	2023
Electricity (kWh)	90,994,288	75,559,362	81,000,952	86,789,622	85,805,251
Natural Gas (GJ)	386,467	329,082	317,030	358,641	341,462
Combined Energy Use (GJ)	781,745	657,736	667,713	753,512	725,445
GHG (t CO2e)	26,438	22,851	22,449	25,525	24,104
Energy Use Intensity (GJ/ m²)	1.25	1.06	1.07	1.21	1.16
GHG Intensity (t CO2e/ m²)	0.042	0.037	0.036	0.041	0.039



Corporate Energy Use Trends Vs Baseline

Note that corporate data below is inclusive of water treatment and distribution as well as O&M accounts including parks and lighting used for the City’s annual reporting.

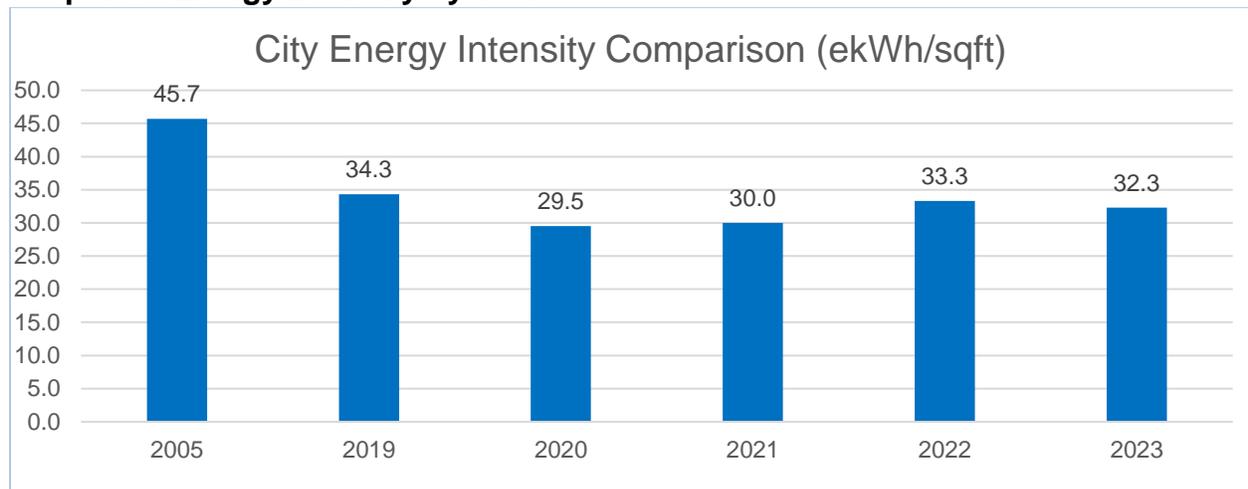
Categories may be named different than those set in BPS reporting. Also note that Entertainment facilities were removed from the reported data in starting in 2022.



Corporate Total Energy Consumption by Portfolio

Total Energy Consumption (in 000's of ekWh)						
Facility	2005	2019	2020	2021	2022	2023
City/Town Halls	13,775	8,899	7,528	6,623	8,662	7,570
Corporate Facilities	17,188	12,256	11,702	9,381	10,936	10,900
O&M and Streetlighting	44,908	26,275	24,194	23,184	22,957	22,875
Hamilton Water	121,040	126,788	145,802	156,362	162,930	171,765
Yards	39,589	27,869	25,517	26,016	27,935	24,601
Arenas	39,904	35,094	24,505	23,673	28,967	29,519
Community & Senior Centres	3,834	3,601	3,122	2,681	3,622	3,536
Rec Centres & Pools	26,789	30,073	27,230	27,000	30,043	29,621
Tim Hortons Field	n/a	9,267	6,652	7,737	8,880	8,223
Rec Parks, Stadiums, Golf Courses	8,332	4,997	4,661	5,134	5,301	5,161
Lodges	24,938	15,774	14,756	15,018	13,699	14,861
Culture	5,383	5,278	3,368	3,222	3,975	3,715
Fire & EMS	10,698	12,803	11,639	11,203	12,181	11,565
Libraries	9,343	11,726	10,654	10,235	10,351	9,595
Police	14,757	8,303	8,303	11,338	11,238	11,884
Entertainment*	20,244	17,565	17,565	16,877	n/a	n/a
Total	400,722	356,568	347,198	355,684	361,677	365,390

Corporate Energy Intensity by Year



Energy Intensity calculation does not include Hamilton Water facilities and distribution or Operational (i.e., streetlighting) accounts.

Appendix D

Definitions

Absolute Emissions are the total corporate emissions expressed in tonnes CO₂e as calculated in the City's Greenhouse Gas Inventory

CDM means Conservation Demand Management

The City of Hamilton, "the City" as referred to in the plan represents the Corporation of the City of Hamilton specifically

Compressed Natural Gas represents utility-grade natural gas which has been compressed for use as a lower-emissions fuel alternative to standard motor fuels such as gasoline or diesel.

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.

Geothermal is a renewable energy source either drawing heat from underground or using heating loops in the ground as a store for heating in winter and cooling in summer.

Greenhouse Gas Emissions or Emissions are gas emitted through City activity with the potential to trap heat in the atmosphere as identified by Environment and Climate Change Canada. For the purposes of this plan, these emissions primarily include Carbon Dioxide, Methane, and Nitrous Oxide.

Greenhouse Gas Inventory is the inventory identifying and tracking corporate Greenhouse Gas Emissions by source. The inventory covers Scope 1, Scope 2, and select scope 3 emissions from Corporate Buildings, Vehicle Fleet, Water and Sewage Buildings, Street Lights, Contracted Waste Fleet, Expensed Kilometers, and Wastewater Emissions.

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.

PNZ means Pathway to Net Zero. The Pathway to Net Zero is a collection of plans identifying how facilities can achieve net zero.

Renewable Natural Gas or Biogas is usable methane produced by landfills, wastewater treatment plants, livestock farms, or other sources where organic matter undergoes anaerobic decomposition.

