



2024 - 2028

Corporate Energy Management Plan

Energy Conservation & Greenhouse Gas Reduction Plan

Table of Contents

PAGE

3	The City and Government Planning	27	Corporate Implementation	62	Capital Investments
7	The City of Oshawa's Corporate Carbon Commitments	32	Organizational Structures for Energy Management	69	Electric Vehicle Charging Stations
10	Achievements	36	Reporting	72	Fleet Services
11	Energy Intensity of the City's Portfolio	41	Energy Commodities: Electricity	74	Street lighting
14	Greenhouse Gas Emissions Reduction	45	Energy Commodities: Natural Gas	77	Summary of Recommended Actions
19	C.E.M.P. New Targets	51	Operations and Maintenance	84	Appendix A - Status of Corporate G.H.G.R.P. items
23	City of Oshawa's Net Zero Retrofit Strategy	55	Quality Assurance	88	Appendix B - City of Oshawa Asset List

C.E.M.P. Introduction

The City of Oshawa established the first Corporate Facilities Energy Management Plan (C.F.E.M.P.) in 2014, with the mission of outlining facility based actions for energy conservation and greenhouse gas reduction. This current plan is the third iteration since the original plan and continues to advance the City of Oshawa's understanding of our carbon footprint, and creation of our path to sustainable asset management.

The Corporate Greenhouse Gas Reduction Plan was established in 2016 to satisfy Milestone 3 of the Federation of Canadian Municipalities' Partners for Climate Protection Program. This plan outlined contributions for greenhouse gas reductions corporately.

The 2024-2028 Corporate Energy Management Plan (C.E.M.P.) has amalgamated these two existing corporate plans, marrying the corporate efforts towards decarbonization with the goal of accountability and meaningful forward action.

The targets and measures defined in this plan bring the City of Oshawa in compliance with the Electricity Act 1998, Ontario Regulation 25/23 and fulfills the Partners for Climate Protection Program's commitment for a corporate action plan to reduce greenhouse gas emissions.

Objectives

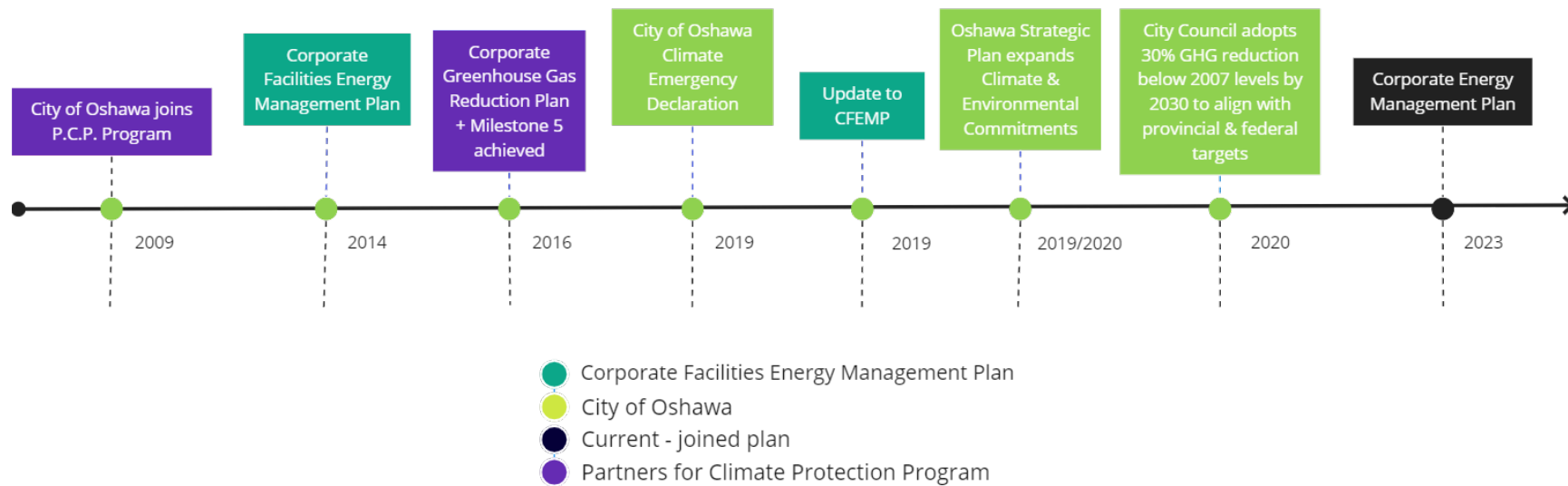
This plan outlines the current status of energy conservation within the City of Oshawa, seeks endorsement for action on identified areas of opportunity, and sets targets to guide future trajectory.

The objectives of this plan are to:

1. Successfully position the City with an energy management strategy that fulfills corporate targets to align with federally and internationally established levels of greenhouse gas reduction and maintains relevance within the energy sector.
2. Support the corporate goals of sustainability, positive environmental impact and financial responsibility.
3. Investigate the progress for energy conservation and demand management within the City of Oshawa's corporate assets, and propose new measures to advance goals.
4. Develop an updated C.E.M.P. that meets requirements for Ontario Regulation 25/23: Energy Reporting and Conservation and Demand Management Plans.

The C.E.M.P. is a working document driven by the goal of continual improvement. As the City of Oshawa's strategy develops, the boundaries of energy management within the corporation are expected to evolve. Figure 1 outlines the history of the C.E.M.P.

Figure 1. City of Oshawa Corporate Energy Management
Timeline of Endorsed Strategy



The City and Government Planning



Figure 2. City of Oshawa and Government Planning

The C.E.M.P. is coordinated with consideration of government, regional and City of Oshawa planning. (Figure 2).

The Paris Agreement

The Paris Agreement is an international agreement adopted by members at the United Nations Framework Convention on Climate Change. Canada played an active and constructive role in securing international consensus on the Paris Agreement, which entered into force on November 4, 2016.

Pan Canadian Framework for Clean Growth and Climate Change

The Pan-Canadian Framework (P.C.F.) for Clean Growth and Climate Change was adopted in 2016, intended to decouple economic growth in the Canadian economy from carbon emissions. Canada's emissions were projected to be 19% below 2005 levels by 2030. This represents the single-largest projected drop in emissions in Canadian history.

A Healthy Environment and a Healthy Economy Canada's Strengthened Climate Plan

A Healthy Environment and a Healthy Economy - Canada's strengthened climate plan was introduced in 2020, building on the P.C.F. with the intention of reducing pollution, creating more good jobs, and to support a healthier economy and environment. The update projected a 31% drop in Canada's emissions by 2030.

Canadian Net-Zero Emissions Accountability Act

The Canadian Net-Zero Emissions Accountability Act, which became law on June 29, 2021, enshrines in legislation Canada's commitment to achieve net-zero emissions by 2050. The Act ensures transparency and accountability as the government works to deliver on its targets. The Act requires public participation and independent advice to guide the Government of Canada's efforts.

2030 Emissions Reduction Plan (E.R.P.)

The Government of Canada published the country's 2030 Emissions Reduction Plan in March 2022. The plan reflects input from provinces, territories, Indigenous Peoples, the Net-Zero Advisory Body, and interested Canadians on what is needed to reach Canada's more ambitious climate target of 40-45% emissions reductions by 2030. The 2030 Emission Reduction Plan is an interim deliverable under the *Canadian Net-Zero Emissions*

Accountability Act. Canada's 2030 Emissions Reduction Plan.

Provincial - Ontario Regulation 25/23

The Ontario Regulation 25/23 is made under the Electricity Act, 1998 which requires public agencies to prepare and submit to the Ministry an energy conservation and demand management plan and a summary of the annual energy consumption for each of the public agency's prescribed operations.

Federation of Canadian Municipalities (F.C.M.)

The F.C.M. represents more than 2,100 municipalities Canada wide. The F.C.M. advocates for these municipalities to ensure federal policies and programs reflect local needs.

Partners for Climate Change Protection (P.C.P.) Program

The P.C.P. program is a voluntary program established by the F.C.M. in 1994. This program was created to help municipalities take action against climate change by achieving 5 milestones:

- Milestone 1 establishes a baseline year for emissions inventories
- Milestone 2 sets emissions reduction targets
- Milestone 3 requires the development of a local action plan (corporate and community plans)
- Milestone 4 is the implementation of the plan
- Milestone 5 involves monitoring and reporting on the success of the plan

Community Greenhouse Gas Reduction Plan

The City of Oshawa Community Greenhouse Gas Reduction Plan was endorsed by Council in November 2020 and subsequently approved by the F.C.M. This plan achieves Milestone 3 by outlining the goal, objectives, scope and community stakeholder engagement strategy for citywide greenhouse gas (G.H.G.) reduction targets.

Oshawa Strategic Plan

The current Oshawa Strategic Plan 2020-2023 is the City's highest level policy document and is guided by the two principles of sustainability and financial stewardship. The plan identifies five goals that will guide decisions made by the City. Despite this plan being due for update this year, it is expected that the strong directive for sustainable leadership in Oshawa will remain. The goal of Environmental Responsibility outlines "Proactive Environmental Management and Combat Climate Change" as a current theme in the plan. The recommendations of this updated C.E.M.P. help to deliver two principles contained in this theme:

1. Identify, evaluate and implement adaptation measures to strengthen the City's resilience to a changing climate, invasive species and other stressors
2. Implement corporate and community plans, targets and benchmarking aligned with federally and internationally recognized targets to reduce greenhouse gas emissions and energy use

Oshawa Official Plan

The Oshawa Official Plan sets out the land use policy directions for long-term growth and development in the city. Coordination of this plan ensures compliance with the Durham Regional Official Plan and provincial policies.

The Oshawa Official Plan outlines the following policies for local development which help to inform this plan:

- The City shall encourage sustainable building design by:
 - (a) Being responsive to new technologies in building construction; and
 - (b) Encouraging energy conservation and identifying opportunities for clean energy generation (e.g. geothermal, photovoltaic panels).
- The use of green building design, such as green roofs, is encouraged to reduce emissions and achieve energy efficiencies.
- It is encouraged that construction designs be responsive to new technologies in energy conservation.
- The City supports incremental reduction of overall greenhouse gas emissions and other air pollutants generated by the municipality's own corporate activities and functions. Monitoring of the City's greenhouse gas emissions shall be undertaken.
- Promote more energy efficient buildings and infrastructure including retrofitting existing development to higher energy efficient standards.

Durham Community Energy Plan

The Durham Community Energy Plan (D.C.E.P.) aims to accelerate the transition to a clean energy economy in Durham while simultaneously achieving economic, environmental and social benefits. It presents a low carbon pathway up to 2050 that lays out a set of long-term strategies.

Having the highest population in Durham Region, it is essential that the City of Oshawa rise as a leader in supporting the outlined best case low carbon scenario, through planning and action.

Oshawa Corporate Facilities Green Building Standard

The Oshawa Corporate Facilities Green Building Standard is a set of construction, retrofit and maintenance minimum specifications that are proposed to be developed as part of this plan. This standard aims to progress the City of Oshawa's decarbonization strategy and recognizes that time is of the essence when advancing zero carbon timelines. This standard will be designed to complement existing corporate standards.

The City of Oshawa's Corporate Carbon Commitments

On September 7, 2010, Oshawa City Council adopted the following corporate Greenhouse Gas emission targets which have been supported by the Corporate G.H.G.R.P., and past iterations of the C.F.E.M.P.:

5% reduction by 2015 from 2007 baseline

20% reduction by 2020 from 2007 baseline

80% reduction by 2050 from 2007 baseline

On January 27, 2020, Oshawa City Council endorsed an interim greenhouse gas reduction target of 30% below the 2007 baseline levels by 2030. This target generally aligned with the Federal and Provincial Government's targets at time of adoption, under the 2020 strengthened climate plan.

The 2019-2023 C.F.E.M.P. set the potential of reducing energy consumption in corporate facilities by 10% by 2023. It stipulates this reduction is based on the current energy efficiency opportunities that were identified in the plan.

The status of these commitments are found in the following sections of this plan.



Corporate Operational Greenhouse Gas Emissions

The Corporate G.H.G.R.P. outlined the following corporate sources of G.H.G. emissions to be reported to the Federation of Canadian Municipalities.

- Owned and Operated Facilities;
- Street Lighting;
- Fleet and Fire Services;
- Corporate Waste; and
- Water and Wastewater.

Since Oshawa does not operate a landfill, the City's G.H.G. emissions from waste were calculated as percentage of total corporate G.H.G. emissions.

The City is not required to report on G.H.G. emissions associated with the processing and delivery of water and wastewater. These services are provided by the Region of Durham.

The P.C.P. Milestone 3 Corporate Plan (DS-16-25) report to Council quantifies the greenhouse gas emissions at the time of achieving Milestone 3 under the Partners for Climate Change Program (Table 1). On March 8, 2016 the City received acknowledgement that Milestone 4, and 5 were also achieved upon the acceptance of this plan. A 33% reduction from 2007 baseline G.H.G. emissions were reported, exceeding the 2020 reduction goal of 20% for corporate emissions.

Reportable Energy, Costs and G.H.G. Emissions

Year	Energy used (GJ)	Energy Costs	Tonnes of Carbon Dioxide equivalent (t CO ₂ e)
2007	291,007	\$6,141,895	16,757
2014	286,375	\$6,811,832	11,157
Difference	-4,632	\$669,937	-5600
% Change	-2%	11%	-33%

(Table 1 – Reportable Energy, Costs and G.H.G. Emissions as reported in DS-16-25 report to council)

Defining City of Oshawa's Consumption Portfolio

The 2019-2023 C.F.E.M.P. references facility energy consumption of 48.723 GWh from January 2017 – December 2017. The discrepancy, between this total and 2017 totals outlined in this plan, is due to reporting inclusions. The energy consumption of previous energy reporting metrics did not isolate which data sets were being used to compare year over year energy use.

The annual totals in the current iteration of the C.E.M.P. include the prescribed operations required by the Electricity Act 1998, Ontario Regulation 25/23 for consistency and to ensure a complete dataset for annual comparisons. By clearly defining the parameters of which buildings are being monitored, the City of Oshawa aims to reduce error in communicating our progress over time, develop accurate trends for analysis and target the buildings that are within our operational control.

The facilities that are not captured in this report will benefit from the energy conservation strategies recommended through this plan, as they continue to be included in capital planning, projects and operational procedures. Challenges in collecting and tracking for the complete city portfolio are addressed in the Quality Assurance recommendations of this plan.

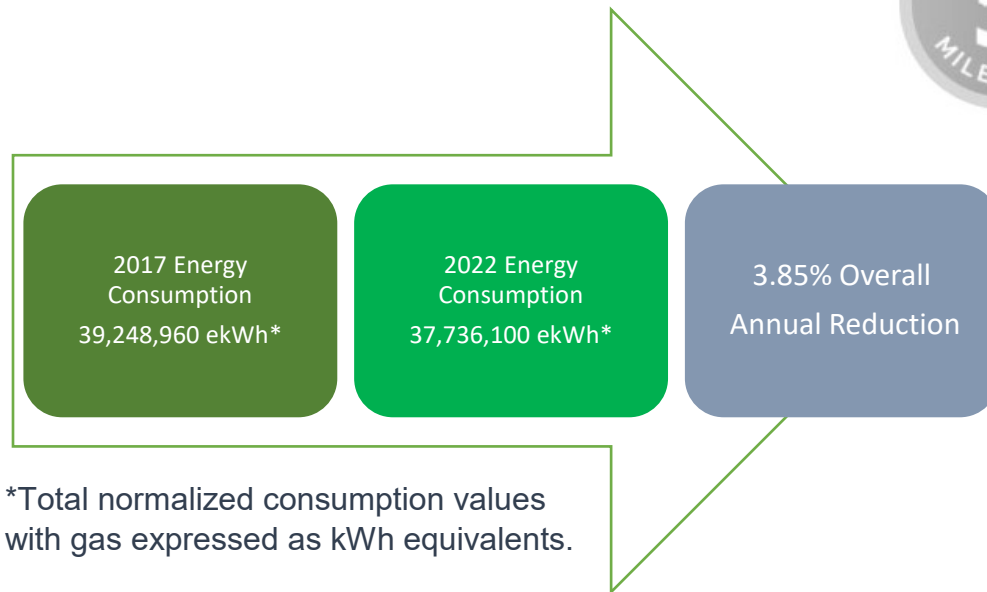
Current Corporate Energy Emissions

The 2030 Emissions Reduction Plan indicates building and transportation sector emission reductions need to be prioritized at this time. In following suit, facility and fleet G.H.G. impacts have been detailed in this plan. A more comprehensive method of tracking all components of corporate G.H.G. footprint is under development.

Achievements



Partners for Climate Change
Protection - Corporate Milestone 5

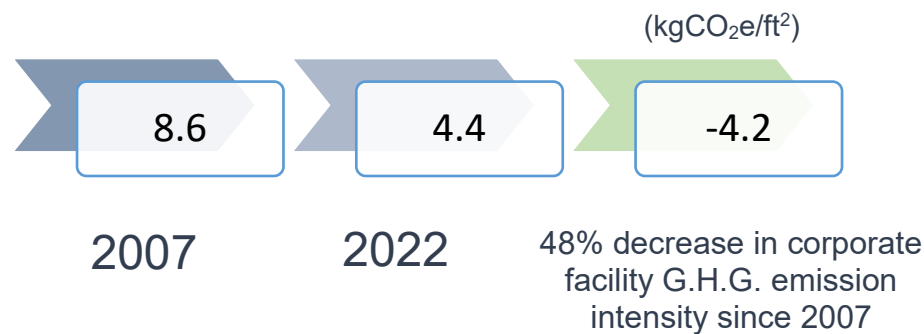


CUSUM of 2018-2022 savings

3,857,162 ekWh*

9.8% cumulative total of savings when compared to the 2017 values.

16 Electric Vehicle charging stations installed



City of Oshawa was selected to receive the esteemed international award of *AEE's Canada Region Institutional Energy Management Award for 2020.*

22% Reduction in Energy Use Intensity of buildings since 2007.

Energy Intensity of the City's Portfolio

The prescribed operations reported here-in align with the July 1st annual publication of energy consumption reporting under the Ontario Regulation 25/23. These facilities comprise the vertical assets for which the City of Oshawa pays utility and operational bills, of which also fall into the categories defined by the regulation. The additional facilities in the City of Oshawa's portfolio can be found in Appendix B.

Table 2 outlines the Energy Use Intensity (EUI) of the City's facilities, rather than comparing year over year consumption. EUI allows for more accuracy in yearly comparisons, automatically accommodating for when renovations change the size of conditioned space. This method also allows similar property uses to be grouped and investigated for outliers. The energy intensity of each facility can be benchmarked against the provincial, national or regional averages to identify how the City's portfolio is performing, and furthermore where better intensities can be achieved.

Source EUI is a measure of the total energy required to operate your building (including energy losses from generation/transmission/distribution). Weather normalization corrects for any changes in temperature that would affect operation, in order to accurately compare year over year. When weather has been adjusted for, there are valuable lessons to be gained by identifying low use periods and defining operational trends in order to replicate the energy savings. The implementation section of this plan will give more detail on how the City of Oshawa will aim to define and action necessary analysis of the EUI data shown here.

The total reduction in source energy use intensity (EUI) that the City of Oshawa has achieved since the baseline year of 2007 is - **46.7 kBtu/ ft²**) or a 22% reduction in energy use.

When compared to 2017 Energy Use Intensity of **182.60 kBtu/ ft²** there has been a decrease of – **14.4 kBtu/ ft²**. This demonstrates the reduction over the past 2019-2023 C.F.E.M.P. term where the goal for energy use reduction was set as 10%. The average reduction when comparing building EUI is approx. 8%.

The Energy Use Intensity trend over the course of the past C.F.E.M.P. allows for a more detailed analysis of facility use in recent years as seen in Table 2.

Table 2 - Weather Normalized Source Energy Use Intensity of City of Oshawa Facilities

Groups	Property Name	Square Footage (ft²)	2007 Source EUI (kBtu/ft²) (A)	2017 Source EUI (kBtu/ft²) (B)	2022 Source EUI (kBtu/ft²) (C)	National Benchmark EUI	Change (kBtu/ft²) 2007 D (C - A)	Change (kBtu/ft²) 2017 E (C - B)
Community Centres	Arts Resource Centre	11,500	162.7	95.4	100	214.1	-62.7	4.6
	Bathe Park Community Centre	3,500	54.4	54.4	36.2	214.1	-18.2	-18.2
	Columbus Community Centre	2,000	174.4	171	164.3	214.1	-10.1	-6.7
	Connaught Community Centre	2,000	97	97	112.2	214.1	N/A	15.2
	Cordova Community Centre	1,200	58.8	58.8	125.7	214.1	N/A	66.9
	Fernhill Community Centre	1,800	164.4	164.4	126.8	214.1	-37.6	-37.6
	Glen Stewart Community Centre	7,000	64.5	64.5	59.5	214.1	-5	-5
	Harman Park Community Centre	2,500	84.1	84.1	79	214.1	-5.1	-5.1
	Kingside Community Centre	4,000	85.2	85.2	61.3	214.1	N/A	-23.9
	Lake Vista Community Centre	3,500	125.8	118.3	131.8	214.1	6	13.5
	Mackenzie Park Community Centre	1,600	57.8	64	79.4	214.1	21.6	15.4
	North Oshawa Community Centre	3,000	76.5	52	37.1	214.1	-39.4	-14.9
	Northview Community Centre	15,000	272.4	233.4	248.3	214.1	-24.1	14.9
	Rundle Community Centre	3,500	77.8	62.9	75.8	214.1	-2	12.9
	Southmead Community Centre	2,500	69.1	68.7	62.9	214.1	-6.2	-5.8
	Storie Park Community Centre	2,500	167.7	112.7	95.9	214.1	-71.8	-16.8
	Sunnyside Community Centre	3,800	52.7	35.3	32.6	214.1	-20.1	-2.7
	Thornton/Dundee Community Centre	3,500	95.8	87.7	91.5	214.1	-4.3	3.8
	Valleyview Community Centre	3,500	127.7	104.7	73.7	214.1	-54	-31
	Woodview Community Centre	15,000	82.7	61.3	48.5	214.1	-34.2	-12.8
Fire Stations	Fire Hall 1	24,000	155.8	135.6	138.8	139.6	-17	3.2
	Fire Hall 2	6,500	189	176.3	179.6	139.6	-9.4	3.3
	Fire Hall 3	9,000	251.5	200.6	189.9	139.6	-61.6	-10.7
	Fire Hall 4	6,500	180	158.9	185	139.6	5	26.1
	Fire Hall 5	17,890	201	194	192.6	139.6	-8.4	-1.4
	Fire Hall 6	10,675	N/A	125.7	134.5	139.6	N/A	8.8
Office	City Hall	128,105	190.5	122.9	118.1	144.9	-72.4	-4.8
	Municipal Law Enforcement	6,800	N/A	141.9	no longer an asset			
	Animal Services	16,500	114	172	190.8	132.2	76.8	18.8

Groups	Property Name	Square Footage (ft ²)	2007 Source EUI (kBtu/ft ²) (A)	2017 Source EUI (kBtu/ft ²) (B)	2022 Source EUI (kBtu/ft ²) (C)	National Benchmark EUI	Change (kBtu/ft ²) 2007 D (C - A)	Change (kBtu/ft ²) 2017 E (C - B)
Operations	Consolidated Operations Depot	88,000	150.5	151	171.3	125	N/A	20.3
	Howden Road Operations Depot	7,100	43.7	43.7	62.5	125	N/A	18.8
Recreation Centres	Children's Arena	30,000	164.3	115.8	116.3	171.8	-48	0.5
	Civic - Centennial Pool	149,037	136.2	104.4	105.9	161.1	-30.3	1.5
	Civic - Dome & Squash Courts	51,000	274.2	177.5	154	166.3	-120.2	-23.5
	Civic - Stadium	11,001	294.9	214.7	246.8	161.1	-48.1	32.1
	Delpark Homes Centre	202,051	340.7	324	252.2	161.1	-88.5	-71.8
	Donevan Recreation Complex	40,000	362.9	298.9	275.3	161.1	-87.6	-23.6
	Harman Park Arena	64,000	140.6	113.5	117.4	145.1	-23.2	3.9
	South Oshawa Community Centre	45,361	307.4	266.3	283.8	161.1	-23.6	17.5
Totals		988,945	214.9	182.60	168.2	N/A	-46.7	-14.40

¹kBtu/ft² = 0.293071 kWh/ft²

² "The Change" columns show how the 2022 EUI compares to 2007, and 2017 EUI respectively. The cells highlighted in blue display increased EUI, demonstrating areas of opportunity for energy conservation measures and auditing.

³Civic is separated due to separation of physical buildings in the complex, and separation of meters.

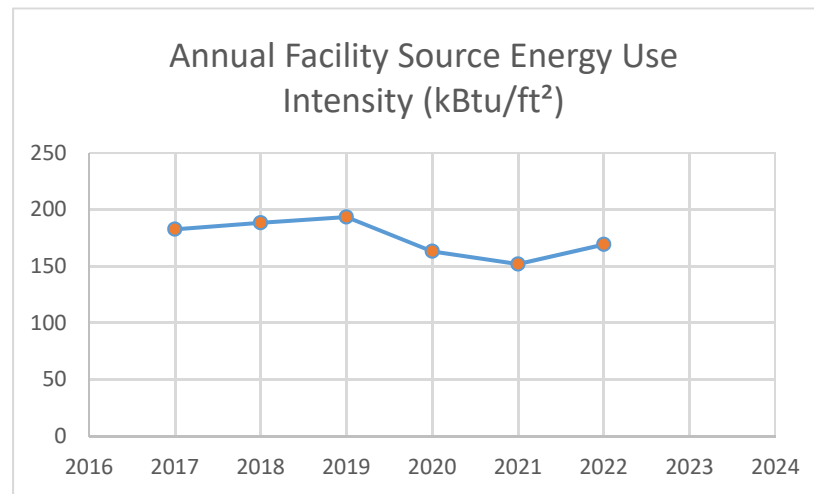


Figure 3. Weather Normalized Source EUI for City of Oshawa Facilities (2017-2022)

Buildings with significant reduction in Source EUI within this period:

- City Hall
- Fire Hall 3
- Civic Dome and Courts
- Delpark Homes Centre
- Donevan Recreation Centre
- Storie Park/Woodview/North Oshawa/Kingside/Fernhill/Bathe Park Community Centres

Buildings with significant increase in Source EUI within this period:

- Fire Hall 4, Fire Hall 6
- Consolidated Operations Depot
- Howden Road Operations Depot
- Civic Stadium
- Animal Services

Many buildings with significant reduction in source EUI can be linked to capital energy projects, such as City Hall, Delpark, Civic and Donevan. Other trends such as community centre reduced loads may be attributed to change in resident's behaviour during the COVID-19 pandemic. The increase in operations depot EUI trends alongside community growth and recent consolidation of resources. Individual investigation is required to determine the details of each facilities' specific changes, replicate successes and make action plans accordingly.

Greenhouse Gas Emissions Reduction

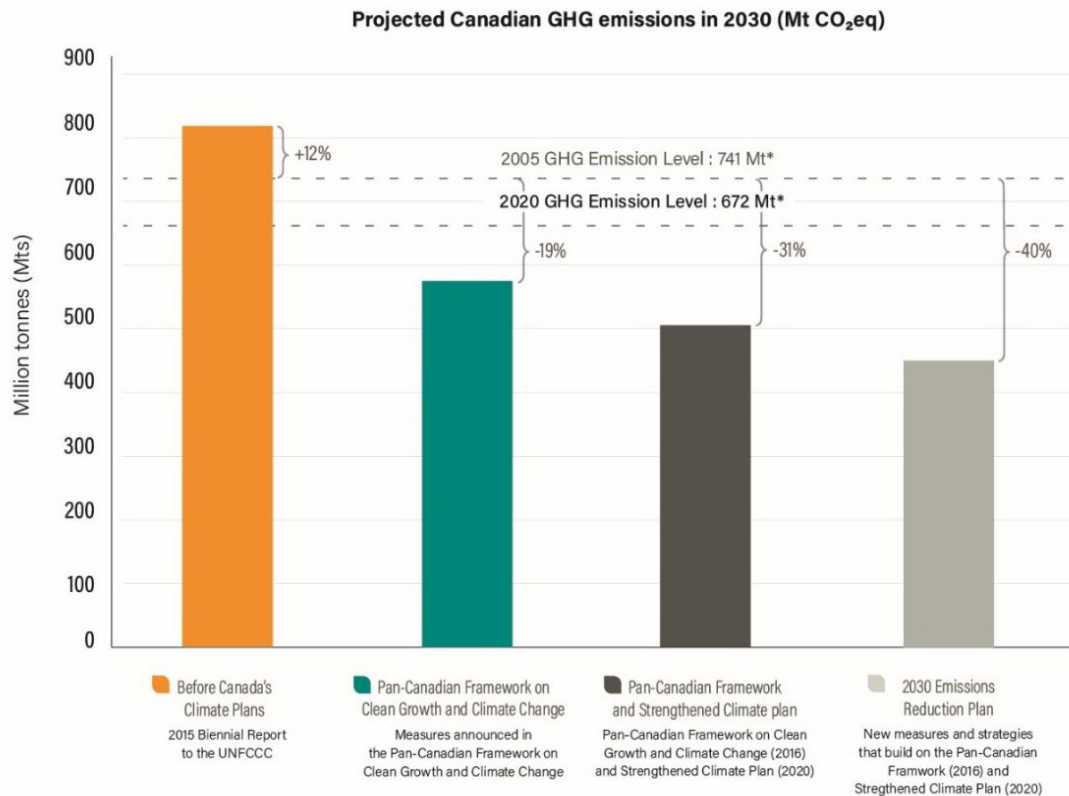
The notable change in G.H.G. reduction from 2007 baselines shows the City of Oshawa's success in developing long term strategies to reduce energy consumption. Comparing Greenhouse Gas emissions intensity of the previously defined 2007 baseline and current G.H.G. emissions from 2022 (as seen in Table 3) indicates sustained reduction of 48%, which surpasses the 2020 goal of 20%.

Table 3. Portfolio Average G.H.G. Emissions Intensity (2007-2022)

Portfolio Measure	Emissions Intensity
Baseline (2007)	8.6
Current (2022)	4.4
Change (kgCO ₂ e/ft ²)	-4.2

Exceeding Our Targets

The Government of Canada published the 2030 Emissions Reduction Plan in 2022. This plan addresses the Paris Agreement targets to reduce emissions by 40%-45% from 2005 levels by 2030. This defines 2030 as an intermediate goal in the trajectory of achieving Net Zero by 2050. Figure 4 shows the progress of government projected reductions.



* historical data from 2022 National Inventory Report

Figure 4. Projected G.H.G. emissions outlined in the 2030 Emissions Reduction Plan.

The City of Oshawa has exceeded the 2030 target, achieving 48% reduction in our corporate facility emissions.

The Emission Reductions Plan defines transportation and buildings as key areas where the largest G.H.G. reductions will occur between now and 2030. The City of Oshawa aims to focus our corporate strategy where we can achieve the largest impact as defined by the overarching national goals.

Recognizing the gap in other corporate emissions data, the City aims to develop accountability for these impacts through this new combined plan.

Efforts to minimize carbon emissions during energy production have created the majority of the Greenhouse Gas reductions associated with building operations today (Fig.7 below)¹. Although the City portfolio's EUI has decreased

since 2017, according to the National Inventory report, emission factors related to the use of gas and electrical commodities have now increased since 2017. An increase in total G.H.G. emissions since 2017 can be seen in Table 4. Increased percentage of natural gas use also impacted these values, with natural gas constituting 59% of and 62% of the total energy use respectively for 2017, and 2022 (Fig.5.). Energy use reductions for the city's average building has helped to maintain the similar values in G.H.G. emissions when comparing 2022 to 2017 values.

Table 4: Annual Totals of G.H.G. Emissions by Asset Group (Tonnes CO₂e)

Asset Group	2007	2017	2022
Community Centres	476	245	267
Fire Stations	508	311	358
Office	1055	413	493
Operations	334	356	430
Recreation Centres	6278	2939	2867
<i>Annual Totals</i>	8650	4264	4415

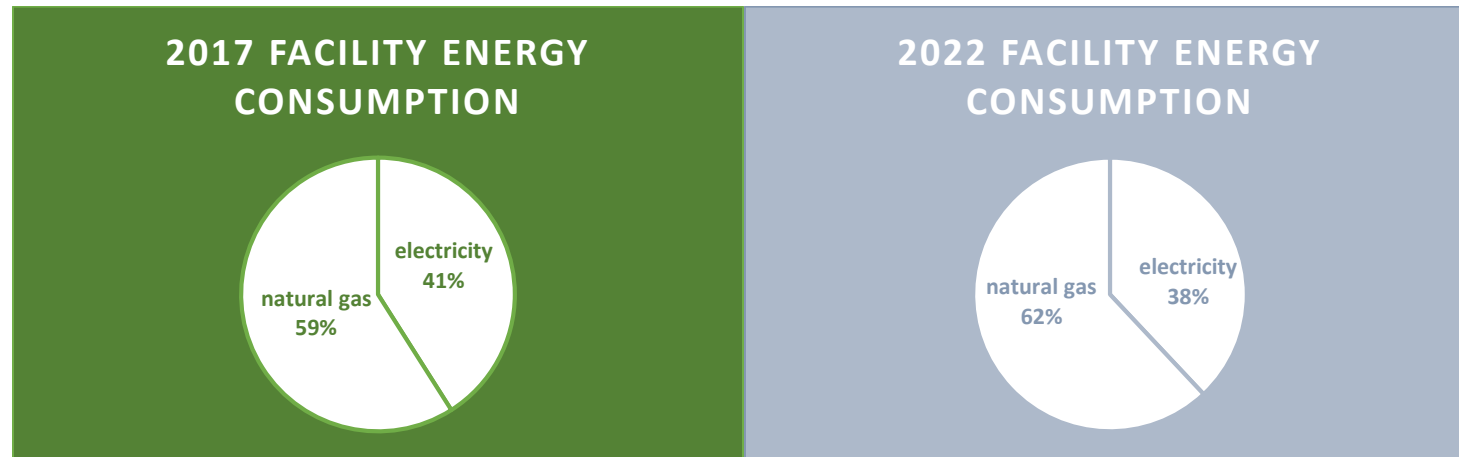


Figure 5. Portfolio Percentage Use of Electricity and Gas in 2017 vs. 2022

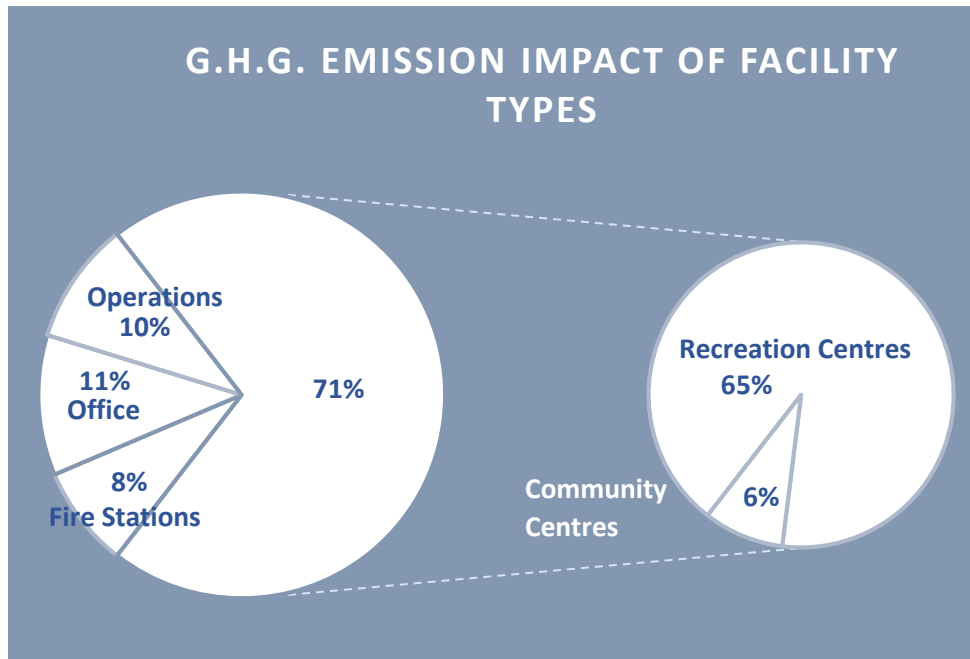


Figure 6. G.H.G. emission percentage of 2022 portfolio by asset

Energy Sector impacts on G.H.G. Reduction

By 2035, the electrical grid could be significantly less reliant on natural gas powered generation, reducing emissions with a fully decarbonized grid possible by 2050.² According to the Government of Canada targets stipulated in the 2030 ERP, a carbon neutral electrical grid by the year 2035 is the ideal scenario.³

¹ Environment Canada. Greenhouse Gas Division., 2021

² Independent Electricity System Operator, 2022

³ Environment and Climate Change Canada, 2022

Fig. 6 shows the G.H.G. emissions apportioned to each facility type in the City of Oshawa portfolio.

Recreation centres and community centres combine to produce 71% of the G.H.G. emissions. Operations accounts for 10%, Offices for 11% and Fire Stations account for 8% of overall facility G.H.G. emissions.

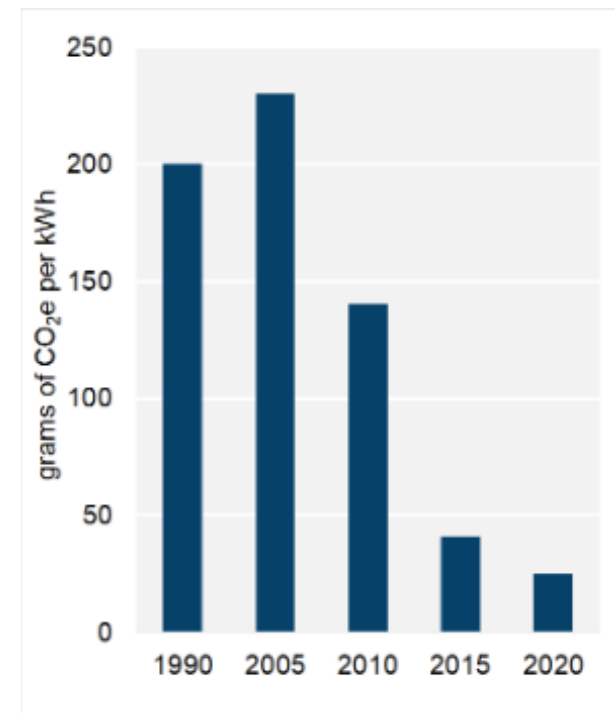


Fig.7. Emission intensity of electricity generation in Ontario from 1990 to 2020.

Although there is opportunity for electricity to be supplied in Ontario as a decarbonized commodity, a large shortfall of electrical supply is predicted in Ontario due to demands of electrification and population growth (Figure 8).⁴

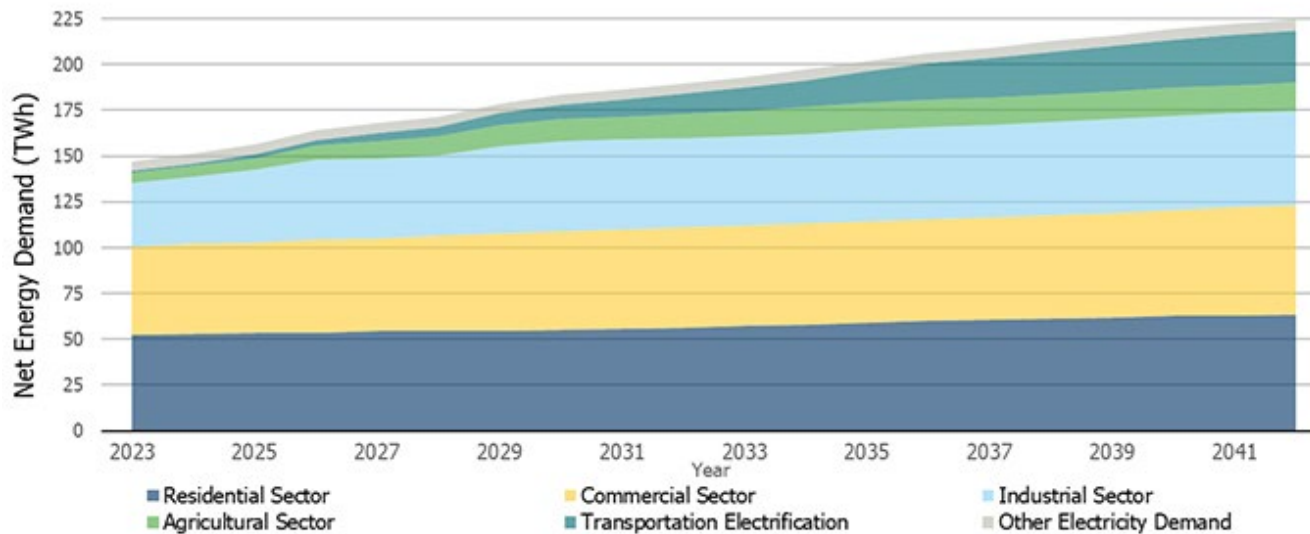


Figure 8. The Future of Electricity Demand in Ontario, Independent Electricity System Operator (I.E.S.O.).⁴

The forecasted demand reinforces the need for large reductions in electrical consumption, and renewable distributed energy production as key elements in the City's Net Zero emission planning strategy, regardless of the low carbon future of electricity. Ensuring the City of Oshawa maintains a strong position against the unpredictable energy markets of the future is essential while planning for fuel switching away from gas. In order to prepare for this shift, the facilities with the highest gas consumption and their associated G.H.G. emission impact are highlighted in Table 5 (p.24).

⁴ Independent Electricity System Operator, 2022

C.E.M.P. New Targets

The following targets are recommended through this plan:

Alignment with federal and regional goals to have Net Zero Emissions by 2050.

This Net Zero Emissions target for 2050 will be supported by three tiers of action.

1. Net Zero Retrofit Strategy targeting 80% of the 2007 greenhouse gas emission levels by 2045.
2. Development of the Oshawa Corporate Facilities Green Building Standard.
3. Continue tackling the remaining 20% of emission through energy efficiency measures as defined in the implementation section of this plan.

Financial Implications

There are no expenditures directly associated with endorsing the recommendations in this plan. As seen historically, the energy management practices outlined in this plan are anticipated to have financial benefits.

The following future capital investments will require Council approval through formal budget requests, in support of this plan.

- Detailed engineering studies as outlined in the Net Zero Strategy section of this plan.
- Capital Projects will follow to deliver Net Zero Retrofits.
- Capital investments in monitoring and verification technology may be required to utilize grants and funding opportunities.

Financial benefits of these targets include:

- Future operational energy cost reduction
- Resiliency to changes in energy sector, through reduced demand and onsite generation
- Reduction of carbon tax associated with operational use
- Shovel ready designs allowing the city to leverage grants and funding opportunities

Corporate Vision for Energy Management

It is recommended that City Council adopt the new vision statement for energy management to establish strong sustainable leadership across corporate culture, and support the joining of the Corporate G.H.G.R.P. and the Corporate Facilities Energy Management Plan.

Proposed Vision

Energy management will be **considered a priority in corporate asset management activities**, including capital, operations and maintenance decisions; and financial management and procurement decisions.

Current Vision

Energy management will be incorporated into all of facilities management's activities, including capital, operations and maintenance decisions; and financial management and procurement decisions.

Corporate Facilities Energy Management Vision, as previously endorsed by Council (C.F.E.M.P. 2019-2023).

The Reduce – Improve – Switch model for Durham Region

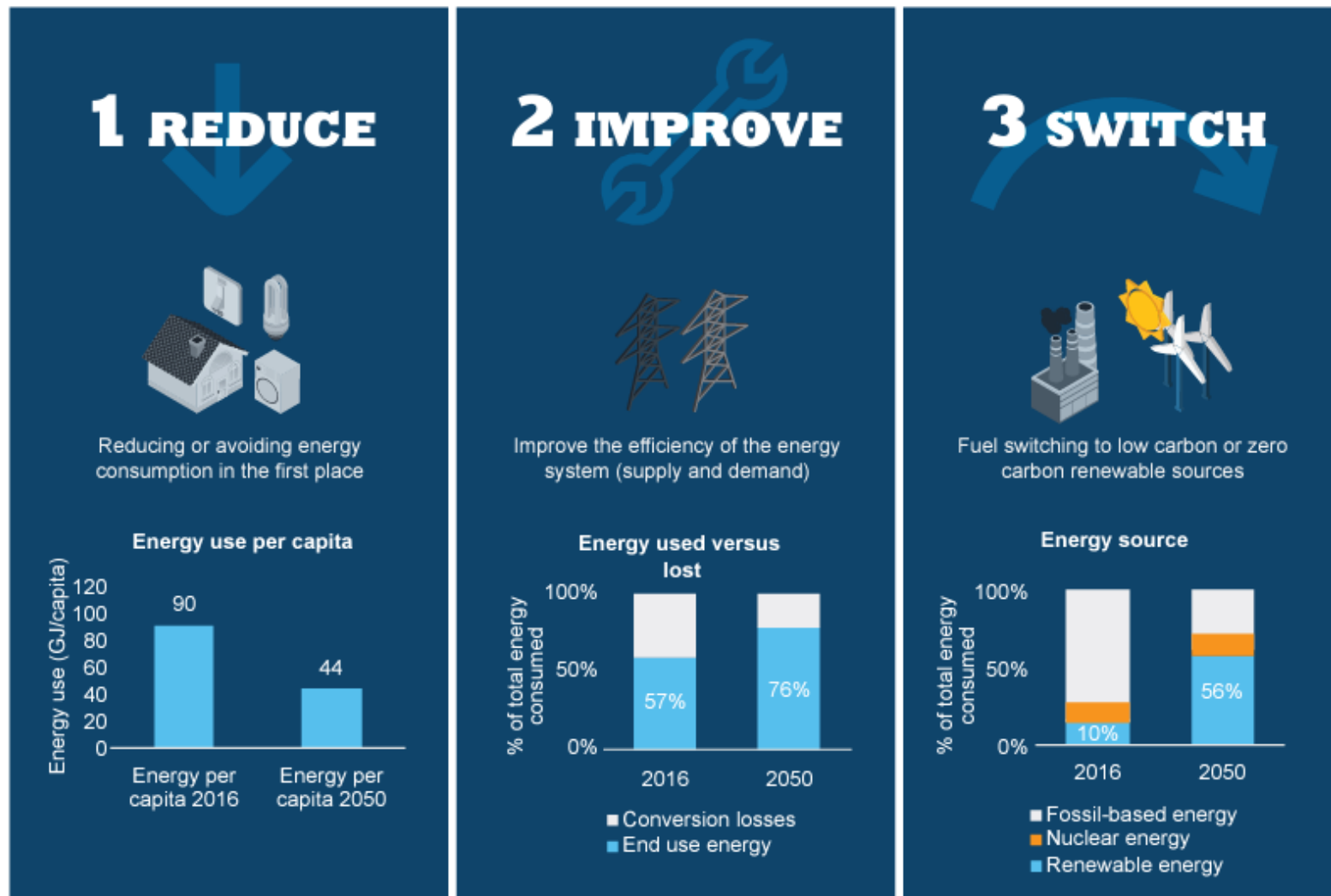


Fig. 9. Reduce – Improve – Switch framework for transitioning the Energy System (as presented in the D.C.E.P.).⁵

The Durham Community Energy Plan (D.C.E.P.) depicts a Reduce-Improve-Switch model (Figure 9.) as a methodology for low carbon fuel switching. The transition to zero carbon renewable sources of energy requires an evaluation of the entire system, and is not isolated to each granular retrofit within a facility.

It is best practice to evaluate envelope and load reduction strategies prior to mechanical retrofits, as these upgrades contribute to avoided capacity and allow for right-sizing of mechanical systems when lifecycle replacements come due. This provides more fiscally responsible investments and a critical reduction in demand, constituting “strategic fuel switching”. Strategic fuel switching describes fuel-switching that saves the consumer money, reduces the total system wide energy consumption and lowers total greenhouse gas emissions in comparison to the previously replaced technologies.⁶ Waste heat recovery solutions also have a large impact in reducing demand to mechanical systems and whole facility boundary.

The Reduce-Improve-Switch approach also optimizes future capital expenditures on renewable and distributed energy systems by right sizing local energy generation to lower loads, and leaving potential for expansion where possible (i.e. Photo-voltaic arrays can be limited by availability of open horizontal space).

Reducing demand and limiting conversion losses through local production is essential for Ontario’s low carbon growth. Considering the limitations of the changing energy system provides insight on how a proactive energy position can help future proof the City’s assets while also contributing to energy security for our community.

The overarching requirement for whole system planning demonstrated in the Reduce-Improve-Switch model has been used to inform our Net Zero Retrofit Strategy, implementing a long term plan for the City’s carbon reduction goals.

⁵ Durham Region, 2018

⁶ Sievers, 2019

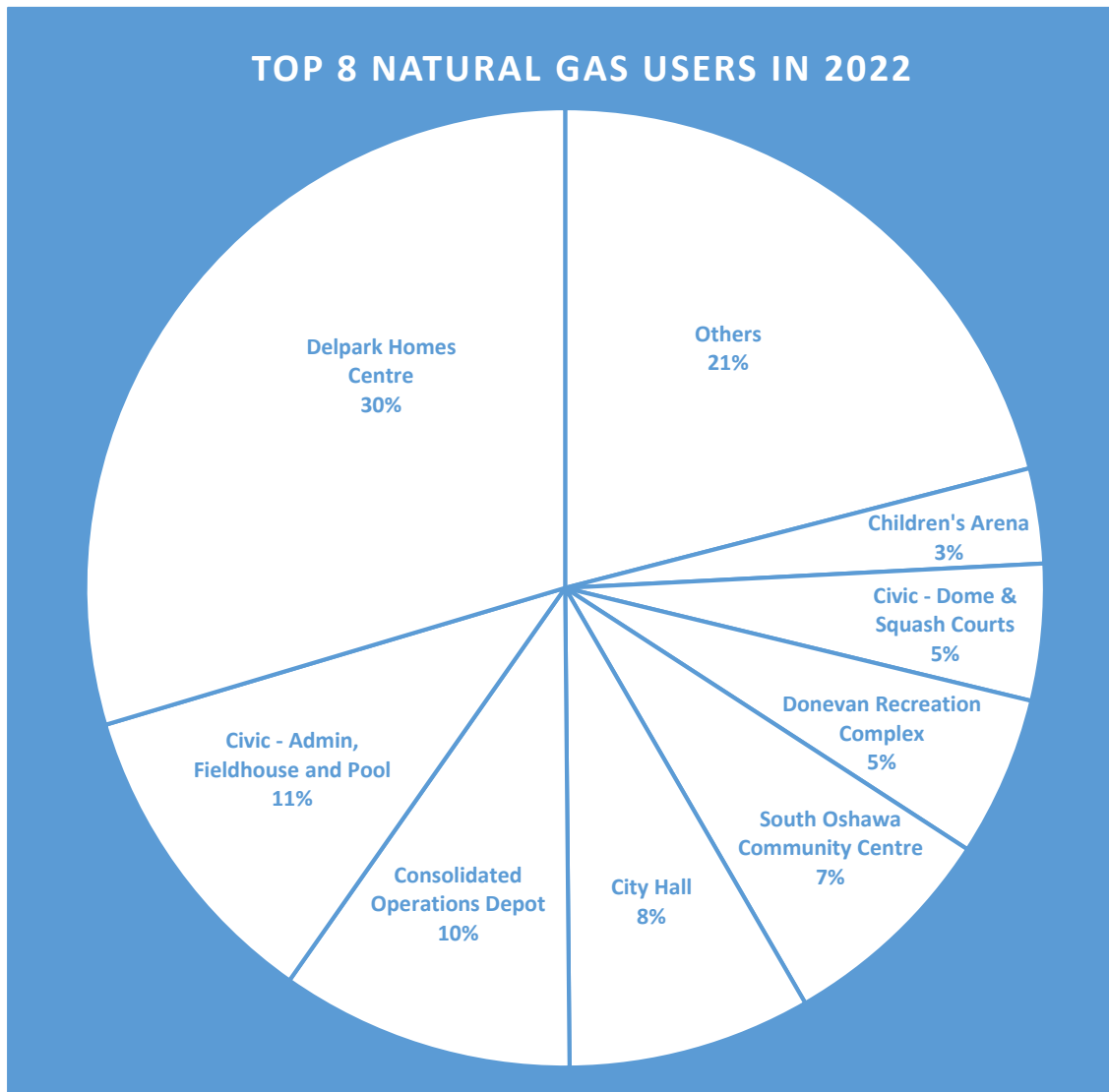


Figure 10. Top Gas Consuming Facilities for the City of Oshawa's Portfolio

City of Oshawa's Net Zero Retrofit Strategy

Goal Develop a meaningful plan to target greenhouse gas reduction while increasing the resiliency of high priority assets that will serve the City of Oshawa for years to come.

Action Upon adoption of this plan, the Corporation of the City of Oshawa will advance a detailed Net Zero retrofit engineering study. The engineering study will model, and quantify a path to achieve 80% reduction in corporate greenhouse gas emissions by targeting top gas consuming facilities (shown in Fig.10) for fuel switching, and providing detailed design specifications for project delivery.

The evolving low carbon future provides a unique opportunity to mitigate commodity market vulnerability through future planning that can best be implemented the sooner we begin. These detailed studies will constitute the first step in achieving the new corporate target of 100% Net Zero emissions by 2050.

Table 5. Net Zero Building Studies: Impact of Net Zero Carbon Emissions at Top Natural Gas Consuming Facilities

Top Candidates	Facility / Measure of G.H.G.	Total G.H.G. Impact (Tonnes CO ₂ e)
1	Delpark Homes Centre	1286.9
2	Civic Recreation Complex	457.1
3	City Hall	383.2
4	Consolidated Operations Depot	428.2
5	Donevan Recreation Complex	249.5
6	South Oshawa Community Centre	326.9
7	Civic Dome	451
8	Children's Arena	130.3
Top 5 Total G.H.G.		2804.9
Total 2007 G.H.G. (100%)		8650.1
Total 2022 G.H.G. (52%)		4415.1
(4415.1 – 2804.9) Tonnes CO ₂ e G.H.G. remaining from 2007 baseline (19%)		1610.2

Table 5 outlines the G.H.G. emissions that correspond with the top 8 natural gas consuming facilities in the City of Oshawa's building portfolio. By targeting a select number of these facilities in the Net Zero Retrofit Strategy, we can reduce the entire emissions baseline substantially. The table shows the top five gas consuming facilities' G.H.G. footprint being equivalent of 80% of the 2007 baseline emissions.

Detailed Engineering Studies

The proposed engineering study will involve the following stages:

1. Define the top consumers that best suit fuel switching and achieving 80% Net Zero emission reductions.
2. Complete Net Zero Retrofit designs, with options provided.
3. Create a roadmap for delivery, defining technologies that need to be converted in tandem, and aligning with the capital plan by establishing timelines for action that is the best fit with projected asset renewal.

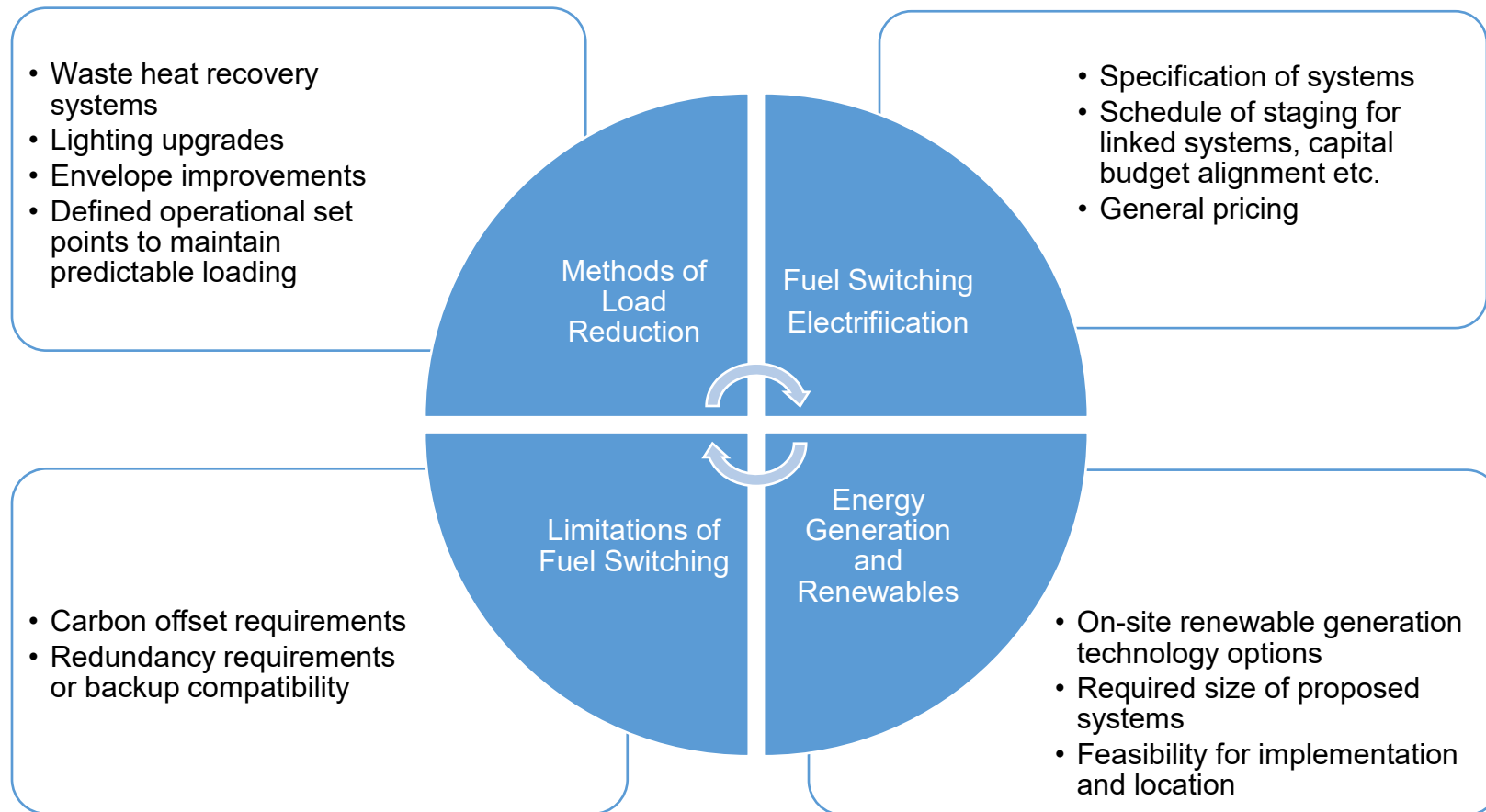


Figure 11. Net Zero Retrofit Design Breakdown

Considerations for implementation of Net Zero strategy:

- An approach that considers the most economically efficient pathway
- Critical Asset Infrastructure would be prioritized for community resiliency
- Technological feasibility
- Emerging technologies that may further impact carbon reduction between now and 2050



Corporate Implementation

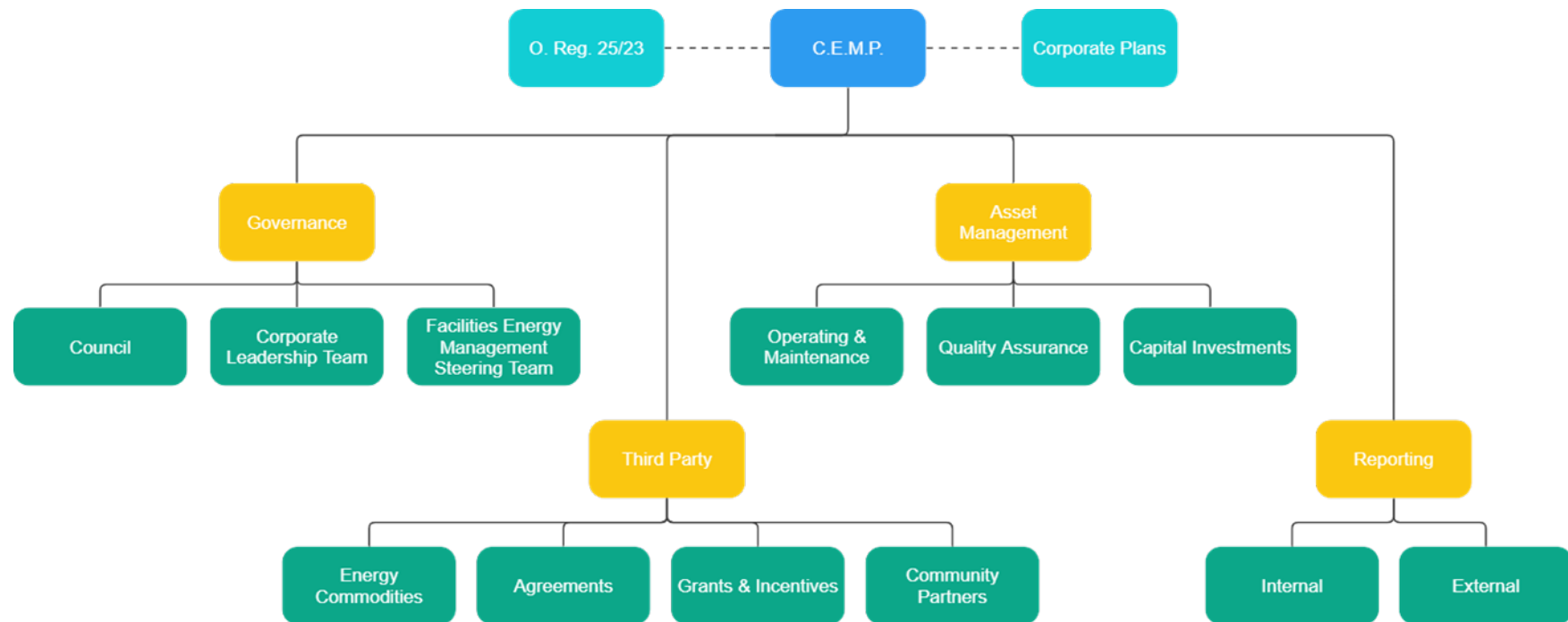


Figure 12. Energy Management Plan Implementation Work Breakdown Structure

Corporate Implementation Subsections

The implementation of energy management practices at the City of Oshawa can be categorized into the four key areas of governance, reporting, third party relationships, and asset management. Figure 12 further breaks down these areas as do the following sections of this plan.

- **Governance**

- Departmental energy conservation measures
- Corporate Energy Culture and Staff Awareness
- Organizational Structure for Energy Management

- **Reporting**

- Internal Reporting
- External Reporting

- **Third Party Relationships**

- Energy Commodities and Services
- Agreements
- Grants/ Incentives
- Community Partners

- **Asset Management**

- Operations and Maintenance
- Quality Assurance
- Capital Investments
- Streetlights and Parking
- Fleet Services

Governance

The responsibilities contained in this plan are governed by City Council, the Corporate Leadership Team and the Energy Management Steering Team. City Council is responsible for plan approval, ensuring the plan meets the best interests of the public. Council approval is also required on an annual basis for budget requests which allow the goals of this plan to become active projects.

The Oshawa City Council has defined the goals of environmental responsibility and financial stewardship as pillars of the Oshawa Strategic Plan.

The Facilities Energy Management Steering Team and other departmental leadership enact the responsibilities that are outlined in the plan. The steering team and department interactions that make this possible are discussed further below when breaking down the organizational structure within facilities energy management.

This plan is prepared by Facilities Management Services and goes into detail regarding the facility energy consumption accounting for the majority of the City of Oshawa's corporate footprint. Details from other departments are included as needed to comment on the greenhouse gas reduction strategies that are being amalgamated by this Corporate Energy Management Plan. For this reason, there may be further strategies and opportunities within other departments that are not included in this plan. Future iterations of this plan will aim to capture these strategies and opportunities as the City's energy use and greenhouse gas reduction targets expand.

Departmental Energy Conservation Measures

Departments that have contributions from the previous Corporate G.H.G.R.P. plan are listed in Table 6. Community Support Services and Operations have further contributions in the plan touching on street lighting and parking, and municipal fleet services respectively. Appendix A lists the completed initiatives from the Corporate G.H.G.R.P. since adoption in 2016, as well as ongoing projects that are not covered elsewhere in this plan.

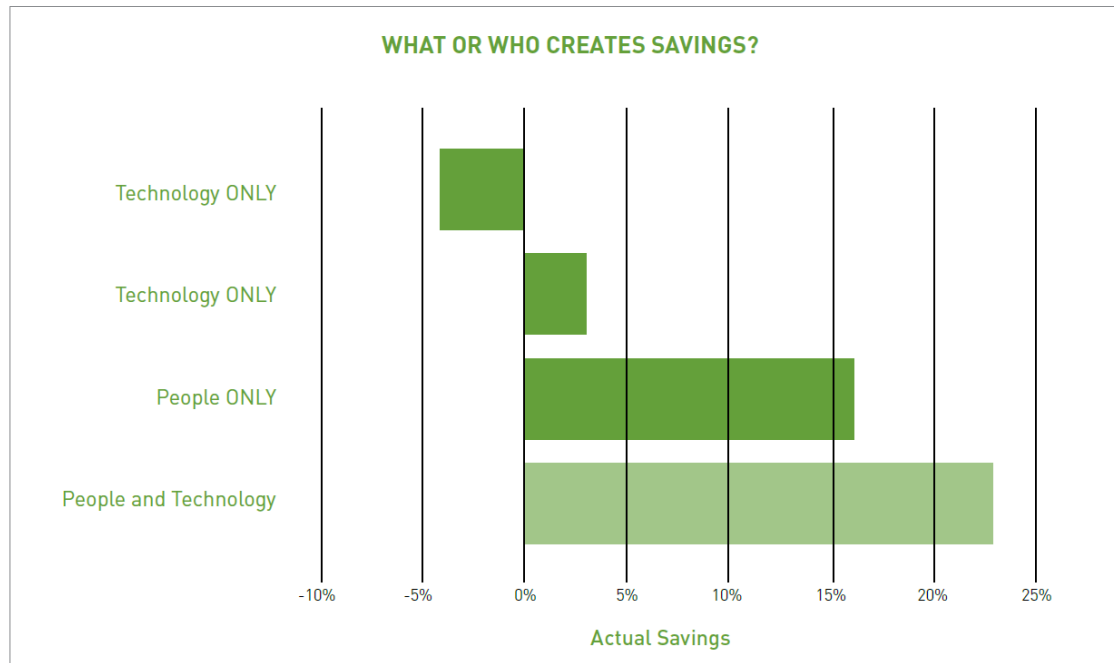
Table 6. Department Contributions to the C.E.M.P.

Department	Contributions
Facilities Management Services (Safety and Facilities Services)	Appendix A and C.E.M.P.
Community Support Services (Community and Operations Services)	Appendix A and Street lighting /Parking
Operations (Community and Operations Services)	Appendix A and Fleet Services
Finance Services (Corporate and Finance Services)	Appendix A
Planning Services (Economic and Economic and Development Services)	Appendix A and inclusions from Corporate G.H.G.R.P.
Human Resource Services (Corporate and Finance Services)	Appendix A

Corporate Energy Culture and Staff Awareness

Extending educational opportunities with the goal of increased climate literacy can influence corporate culture and promotes an energy team mentality.

A study by the “Carbon Trust” demonstrated the impact of technological improvements compared to incorporating human resources and education to produce successful, lasting energy impacts.⁷ By testing four different combinations of technology and educational awareness strategies, in four different buildings, it was found that engaging with the users and operators in the building was the most essential factor for increasing conservation. Two buildings only used technology and the resulting energy savings were significantly reduced, or completely absent as shown in Figure 13.



Education and employee awareness will be promoted in the corporate culture by implementing training and awareness initiatives, reaching staff through i-Connect and i-Learn corporate portals. The use of conservation challenges and technological advances that make energy information available to staff will also be explored. Effective energy data management will be integral in re-enforcing energy messaging to all staff, providing the opportunity to give accurate feedback on measures taken to control energy use.

Figure 13. Technology and People Engagement Study by The Carbon Trust.⁷

⁷ The Carbon Trust

Organizational Structures for Energy Management

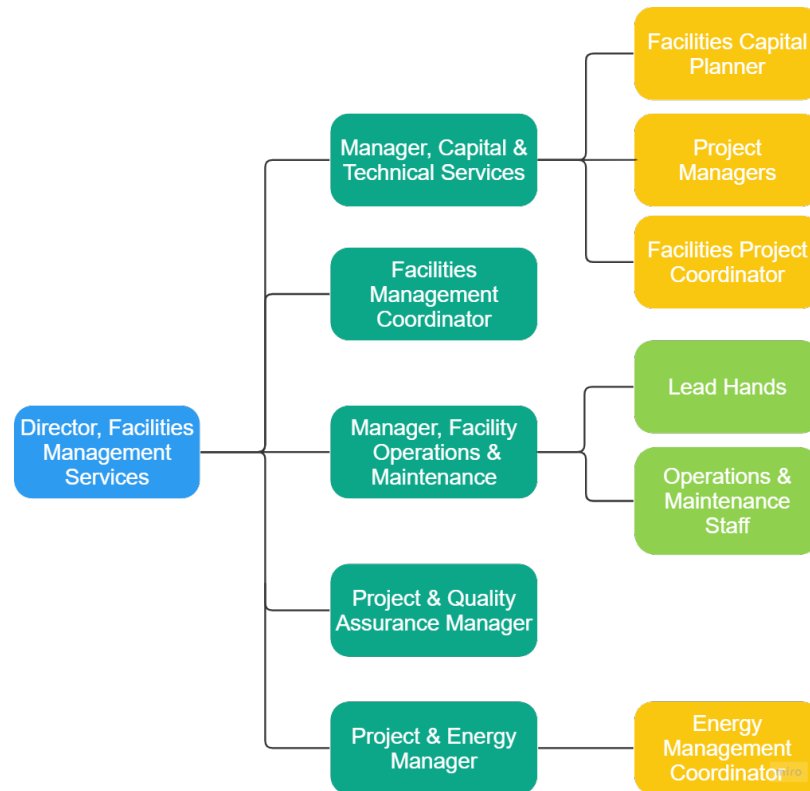


Figure 14. Facilities Management Services (FMS) Organizational Structure at the City of Oshawa

Please be advised this is not a comprehensive organizational chart as it pertains specifically to the energy management strategy of facility projects and excludes security and parks planning roles.

The expansion of the Corporate Energy Management Plan beyond a facility specific scope presents the opportunity for internal collaboration within City Departments. Initiatives that promote energy efficiency and fiscal responsibility will encourage staff collaboration, while continuing the momentum of the City's sustainable principles. Communication and organizational change is needed to achieve the level of integration desired in the proposed corporate energy vision. Figure 14 highlights the organizational structure of FMS, and energy management for facilities.

Three categories of energy focus teams are proposed to achieve this.

City of Oshawa Corporate Energy Advisory Team

This is a visionary and planning team intended to unite the City of Oshawa's stakeholders in concept collaboration, and future ideation for the City of Oshawa's corporate energy strategies. The dynamic and evolving energy sector requires a forward planning approach to ensure excellence in energy management and carbon reduction. The term of this C.E.M.P. will be used to establish and implement this Energy Advisory Team, laying the groundwork for years to come. With focus on the feasibility and impact of larger scale initiatives, this group will allow meaningful conversations with community partners where symbiotic energy opportunities exist. NRCan suggests that an Energy Team is comprised of representatives from each operational area that significantly affects energy use.⁸ It is proposed that this team will include, but not be limited to representatives from; engineering, purchasing, operations and maintenance, buildings and facilities management, environmental health and safety, corporate real estate and leasing, construction management, and when relevant community partners such as utilities, contractors and suppliers.

Facilities Energy Management Steering Team

The Facilities Energy Management Steering Team is comprised of the Project and Energy Manager, Energy Management Coordinator, and individuals who directly manage operations and maintenance within City facilities.

The focus for this group will be to support energy initiatives for mechanical optimization, O&M and staff competencies. The group will develop robust energy conservation practices by unifying stakeholder direction, identifying education opportunities for appropriate staff, and developing a path for meaningful feedback from the Staff Working Group to the Project and Energy Manager. This group will be the core of the City of Oshawa corporate Energy Advisory Team.

Energy Staff Working Group

The formation of an Energy Staff Working Group is pivotal to produce sustainable, energy efficient operational measures in our facilities. A staff working group acts as a necessary channel of communication to develop corporate buy-in and promote energy conscious actions. The City of Oshawa's renewed commitment for developing this critical staff engagement is outlined below.

⁸ Energy Star, 2019

Staff Working Group Priority Steps

Identify internal roles – who is involved and what are their responsibilities

Identify training opportunities – create implementation plan

Identify potential to impact energy use – initial development of operational energy objectives

Establish performance metrics - define performance indicators for operations and maintenance that are relevant to each facility type and priority systems

Identify external roles – what support is needed to implement energy measures in operations and maintenance

Define resource needs – identify dedicated human resource and funding requirements to achieve success

Define schedule – standing commitment for progress

The operating and maintenance provisions, outlined in the Asset Management portion of this plan, rely heavily on the education, skills, and behavioural perspectives of those operating the facility. By giving energy performance responsibilities to City of Oshawa's daily operating staff, their specific expertise will be utilized as well as gain valuable input on where limitations currently reside.

The Energy Staff Working Group (S.W.G.) priority steps are adapted from the NRCan Energy Management Guidelines 2019 for determining roles and resources.⁸

The S.W.G. has been identified by The Facilities Energy Management Steering Team to include:

- Operators
- Lead hands
- Skilled Trades
- Project and Energy Manager
- Energy Management Coordinator

Table 7. Summary of City of Oshawa Energy Management Organizational Structure

Role / Team	Description
Task a Qualified Staff Member	In 2021, City Council approved the Energy Management Coordinator to be a permanent role.
Assign Energy Management Function	In 2023, the FMS team adopted an energy specific Project & Energy Manager role. The function of this role is to develop and implement programs and projects that support and evolve the Corporate Energy Management Plan.
Energy Staff Working Group (S.W.G)	This iteration of the plan evaluates the roadblocks that have slowed progress toward the creation of this group, and re-commits to a S.W.G. as essential. The S.W.G. is re-defined as operational personnel, with an on-site mechanical and electrical focus. Priority first steps for initiation have been established to facilitate immediate adoption.
Facilities Energy Management Steering Team	The creation of this steering team enables support and delivery of the S.W.G.'s scope to be identified through facility management. This will identify and troubleshoot barriers which may exist in operational energy conservation initiatives, as well as ensure support from management throughout the organization.
City of Oshawa Energy Advisory Team	Collaborative group to support energy projects requiring planning and implementation beyond the purview of FMS & daily operational teams. The impact of this team will grow as the Corporation of the City of Oshawa sets more ambitious energy conservation targets.

Reporting

City of Oshawa Energy Management - Internal Reporting

Table 8. City of Oshawa Energy Management Summary of Internal Reporting

Internal Report	Purpose	Frequency	Content and Method of Reporting
Council	C.E.M.P. update	Max. of 5 years	Recommended updates to the Corporate Energy Management Plan are published in the form of written report, supported by data analysis and historic progress.
	Project approval	Annually	Description of energy project scope with business case provided. Submitted through standard budgetary approval process.
	Ad hoc	As needed	N/A
Progress	Benchmarking	*Monthly / Quarterly / Annually	Comparison of facility baseline metrics and historic use. This includes each facility or for facilities relevant to current projects.
	M&V	On Project Basis	As laid out for each measurement and verification plan established at the onset of project.
CLT	Progress	Annually	Update of C.E.M.P. measures and planned projects, with business case provided.

Internal Report	Purpose	Frequency	Content and Method of Reporting
Financial	Revolving Energy Fund Reserve contributions	Annually	Anticipated savings of energy conservation measures, followed by verification of savings delivered, as confirmed through measurement and verification plan. Summary of incentives that have been paid to city for energy project implementation.
	Federal Gas Tax Reporting	Annually Q1	Update on progress of energy projects, and quantified savings.
	Utility performance and planning	TBD	Summary of utility expenditures, rate class recommendations, changes in demand and planning considerations.
	Commodity Procurement	Monthly/Bi-annual review of hedging	Delivered through third party procurement service. Reviewed with additional reporting as pertinent to hedging strategy.
	Project approval	Annual budget approval process	Follows typical budget process.
Audit of EM Progress and Performance	Assessment of Energy Management Implementation	Annually	Evaluation of KPIs to be defined for the implementation of this plan and assess need for redirection where appropriate.

*This monthly frequency is an ideal reporting frequency based on the goals of FMS to adopt data management software that can present and compare energy information while optimizing human resource potential.

External Reporting

Province

On February 23, 2023 the province revoked the Ontario Regulation 507/18, replacing it with Ontario Regulation 25/23: Broader Public Sector: Energy Reporting and Demand Management Plans. Although some methods of reporting details have been adjusted the intention of the plan remains unchanged.

The plan fulfills the Government of Ontario's Regulation 25/23 Electricity Act, 1998, under Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans. This regulation requires all public agencies such as the City of Oshawa to prepare an energy conservation and demand management plan. Once approved by senior management and City Council, the plan is to be published on its website and made available to the public in printed form before July 1 of 2024 including:

1. A summary of annual energy consumption for each of the public agency's prescribed operations.
2. A description and a forecast of the expected results of current and proposed activities and measures to conserve the energy consumed by the public agency's prescribed operations and to otherwise reduce the amount of energy consumed by the public agency, including by employing such energy conservation and demand management methods as may be prescribed.
3. A summary of the progress and achievements in energy conservation and other reductions described in paragraph 2 since the previous plan.
4. Such additional information as may be prescribed by regulation. 2018, c. 16, s. 2.

Additional information the energy conservation and demand management plan must include:

1. A summary of annual greenhouse gas emissions for each of the public agency's prescribed operations, which shall be included in the summary of the public agency's annual energy consumption required under paragraph 1 of subsection 25.35.2 (3) of the Act.
2. A description of the results of previous activities and measures to conserve the energy consumed by the public agency's prescribed operations and to otherwise reduce the amount of energy consumed by the public agency, including by employing such energy conservation and demand management methods as may be prescribed.

3. The cost and saving estimates for the public agency's current and proposed activities and measures referred to in paragraph 2 of subsection 25.35.2 (3) of the Act.
4. A description of any renewable energy generation facility operated by the public agency and the amount of energy produced on an annual basis by the facility.
5. A description of,
 - i. the ground source energy utilized, if any, by ground source heat pump technology operated by the public agency,
 - ii. the solar energy utilized, if any, by thermal air technology or thermal water technology operated by the public agency, and
 - iii. the proposed plan, if any, to operate heat pump technology, thermal air technology or thermal water technology in the future.
6. The estimated length of time the public agency's current and proposed activities and measures referred to in paragraph 2 of subsection 25.35.2 (3) of the Act will be in place.
7. A confirmation that the energy conservation and demand management plan has been approved by the public agency's senior management.

Federation of Canadian Municipalities

There are no reporting requirements under the Partners for Climate Change Program once Milestone 5 is achieved. In order to meet ambitious federal and international recommendations, the Milestone Framework encourages members to continue to set mid-term target and long-term targets. Figure 15 shows the 5 Milestones under P.C.P. Framework. This recommendation aligns with the Intergovernmental Panel on Climate Change's (I.P.C.C.) scientific targets of a 45% reduction by 2030 and net-zero by 2050.⁹

It is recommended that after achieving Milestone 5 the corporate action plan be treated as a living document that can be revised as information, ideas and circumstances evolve.



Figure 15. Five Milestones of the Partners for Climate Change Program.⁹

⁹ Federation of Canadian Municipalities, 2021

Third Party Relationships

Energy Commodities

The procurement of energy is equally as important to the conservation of energy. Responsible energy procurement involves rate optimization, utility account management, supply reliability and quality, demand and supply optimization and risk management.¹⁰ In 2007, the City of Oshawa developed a corporate hedging policy to allow for the price hedging of electricity and natural gas.

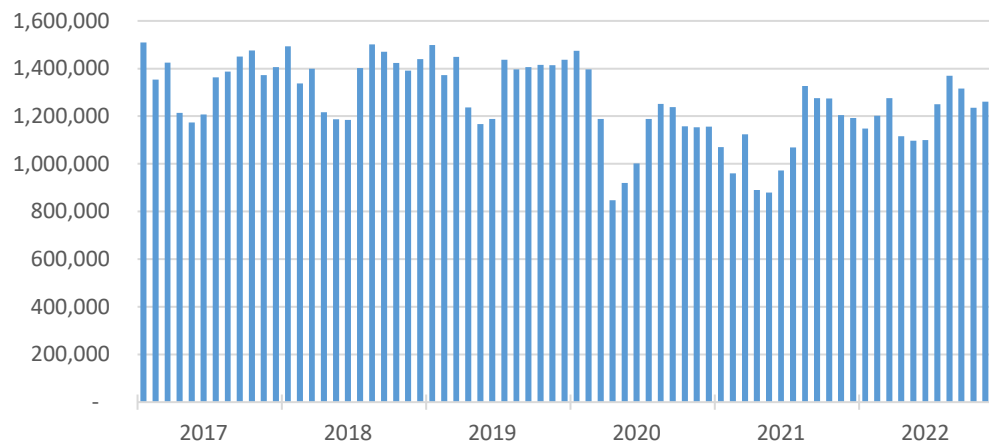
Electricity

The Corporation of the City of Oshawa procures electricity through the local utility, Oshawa Power.

Recently the City renewed our contract for electrical commodity consulting services with WattsWorth Analysis Inc.

Currently the City does not engage in hedging contracts for electricity. This option is currently under review due to current changes in electrical markets, rate structures and commodity pricing trends.

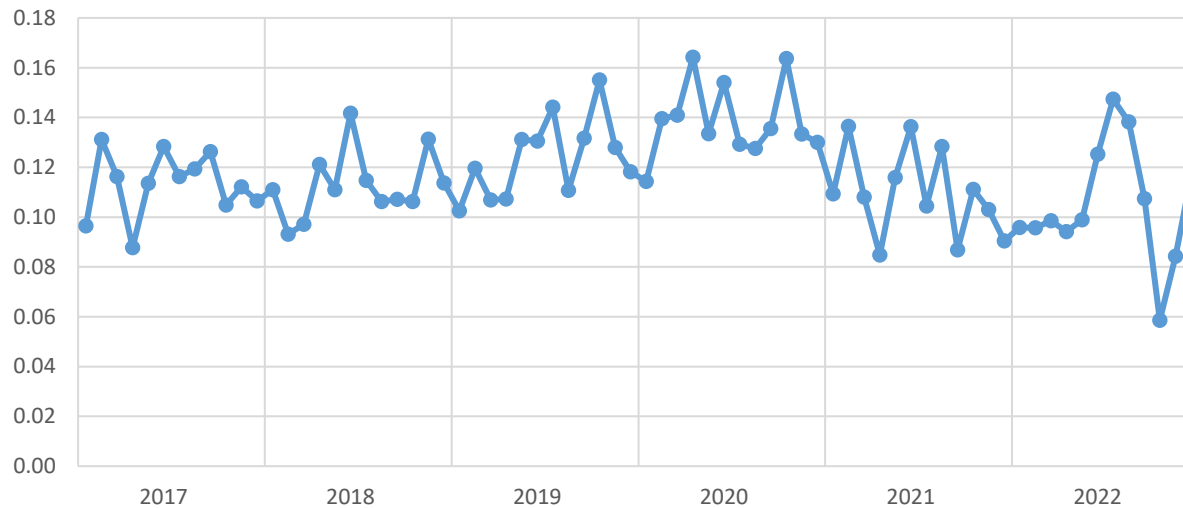
Figure 16. Electrical Use from 2017-2022 (kWh)



The electricity data for Oshawa's portfolio reveals a distinct seasonal pattern, with lower consumption during the spring months (April, May, and June) compared to other seasons. Additionally, the slight reduction in kWh usage over time is depicted in Figure 16. The year 2020 stands out as having a dip in usage, due to the COVID-19 pandemic and resulting changes in occupancy and behaviour.

¹⁰ City of Thunder Bay, 2019

Fig. 17. Oshawa's Electricity Commodity Rate (\$/kWh)



Years	\$/kWh
2017	0.1132
2018	0.1124
2019	0.1237
2020	0.1376
2021	0.1092
2022	0.1054
Average	0.1169

Electrical rates for Oshawa's facilities have fluctuated between 0.07 and 0.17 cents per kWh over the 2017-2022 term, as shown in Figure 17. The highest rates occurred during the spring and summer months, while the lowest rates occurred during the fall and winter months.

In the past Global Adjustment (GA) opportunities for demand response were not accessible to the City's prescribed operations based on rate class limitations. Industry trends are changing from past years with a shift toward reduced GA and increasing Hourly Ontario Energy Pricing (Figure.18).¹¹

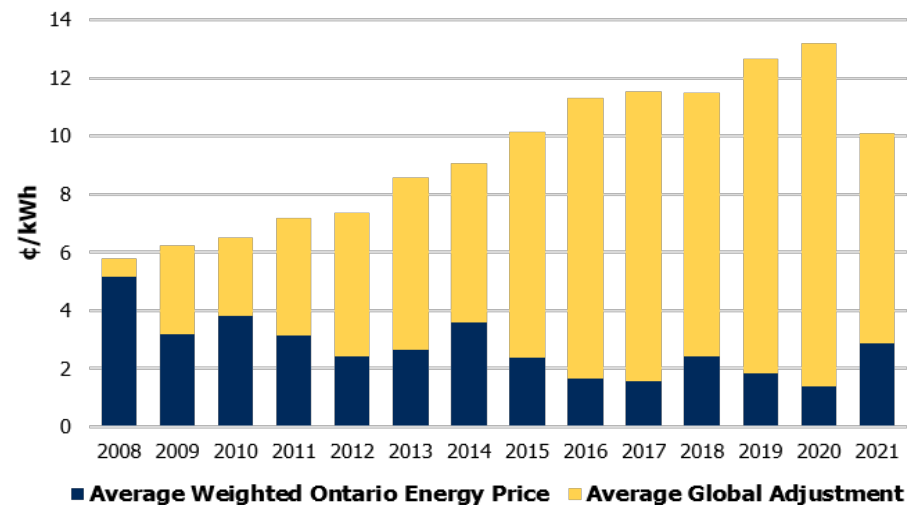


Figure 18. Hourly Ontario Energy Price and Global Adjustment Distribution

¹¹ Independent Electricity Service Operator, 2023

Close attention will be paid to market changes and opportunities to procure electrical hedging contracts similar to what is done with natural gas.

Figure 19. Comparison of kW Demand for Top 7 Interval Facilities

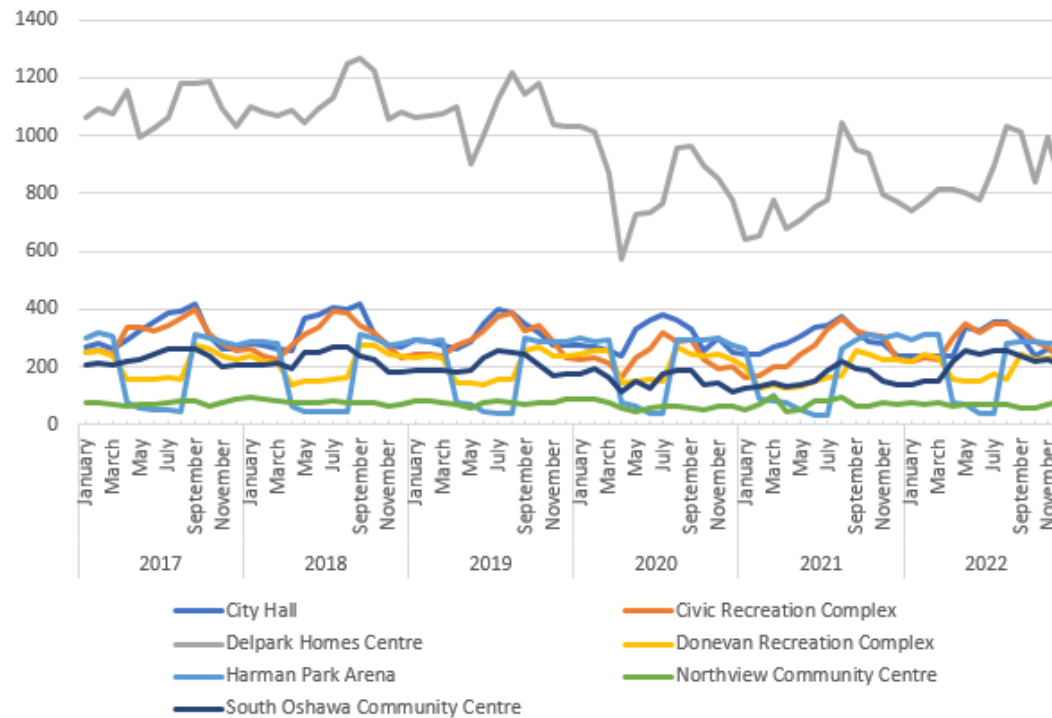


Figure 19 shows the seven facilities where we have access to hourly data, allowing us to accurately calculate demand values. Note that the two high consumption accounts excluded from this chart are Consolidated Operations Depot and Civic Dome, as they lack interval reads. These facilities are flagged as potential candidates for metering technologies to be implemented.

Table 9. Average Demand of Top Electricity Consuming Facilities (kW)

Facility	2017	2018	2019	2020	2021	2022
Delpark Homes Centre	1,095	1,125	1,079	847	791	859
City Hall	319	325	314	302	294	282
Civic Recreation Complex	310	299	298	237	261	288
Donevan Recreation Complex	212	206	205	215	180	201
South Oshawa Community Centre	229	224	205	157	159	215
Harman Park Arena	200	190	192	214	177	213
Northview Community Centre	76	78	77	66	72	70

Table 10: Peak Demand of Top Electricity Consuming Facilities (kW)

Facility	2017	2018	2019	2020	2021	2022
Delpark Homes Centre	1,187	1,268	1,218	1,029	1,043	1,030
City Hall	420	417	401	383	377	359
Civic Recreation Complex	402	391	388	319	366	352
Donevan Recreation Complex	278	276	276	270	259	247
South Oshawa Community Centre	265	272	256	192	220	259
Harman Park Arena	319	312	301	300	314	313
Northview Community Centre	90	95	88	92	101	81

Overall, the prescribed facilities in this plan spent approx. \$2,187,289 on demand-based charges, this is 15.92% of the total electricity cost for these facilities. The average demand of the buildings (Table 9) has been shown alongside the peak demand (Table 10) to demonstrate the variable loading that can be analyzed for load shifting and savings.

Natural Gas

The Corporation of the City of Oshawa procures natural gas through the local Enbridge utility as well as through hedging contracts delivered through consulting services.

The City maintains our contract for consulting services with Blackstone Energy Services Inc.

Table 11: Natural Gas Commodity Cost Jan 2020 to Mar 2023

Gas Procurement Method	Amount
Blackstone	\$678,877.75
Enbridge System Gas	\$994,947.76
Savings with Blackstone	\$316,070.01

Table 11 outlines the cost savings that the Corporation of the City of Oshawa has achieved through natural gas hedging contracts since initiation in 2020.

In 2022 carbon tax comprised 26% total of the Corporation of the City of Oshawa's natural gas costs, with commodity price (44%) and utility costs (30%) constituting the remaining breakdown. The facilities reported in this plan saw an increase in gas consumption of 12% between 2021 and 2022. As outlined in Table 12, the natural gas carbon levy will continue to climb at rates that have been pre-defined until 2030 by the Greenhouse Gas Pollution Pricing Act (GGPPA) in order to establish market certainty and carbon de-intensification.¹²

¹² Government of Canada, 2018

Table 12: Projected Natural Gas Carbon Levy Expenditures for City of Oshawa

Natural Gas: Prices - Past & Future + Carbon Levy

Effective	\$ /Tonne	Per Consumption Tariff		Forecasted Carbon Spend*
		Approximate \$/GJ	Approximate ¢/m3	
2019-04-01	\$20	\$1.00	3.9	\$68,620
2020-04-01	\$30	\$1.50	5.9	\$102,930
2021-04-01	\$40	\$2.00	7.8	\$137,240
2022-04-01	\$50	\$2.50	9.8	\$171,550
2023-04-01	\$65	\$3.25	12.7	\$223,015
2024-04-01	\$80	\$4.00	15.6	\$274,480
2025-04-01	\$95	\$4.75	18.6	\$325,945
2026-04-01	\$110	\$5.50	21.5	\$377,410
2027-04-01	\$125	\$6.25	24.4	\$428,875
2028-04-01	\$140	\$7.00	27.4	\$480,340
2029-04-01	\$155	\$7.75	30.3	\$531,805
2030-04-01	\$170	\$8.50	33.2	\$583,270
2035-04-01	\$203	\$10.13	39.6	\$694,778
2040-04-01	\$235	\$11.75	45.9	\$806,285
2045-04-01	\$268	\$13.38	52.3	\$917,793
2050-04-01	\$300	\$15.00	58.7	\$1,029,300

This table describes the carbon levy the City of Oshawa incurs at the current daily delivery volume of 188 GJ/day.

This daily delivery volume constitutes the natural gas delivery to buildings included in our natural gas hedging contract.

Renewable Energy Resources and Distributed Generation

Multiple opportunities for renewable and distributed energy are available to the City of Oshawa. These measures require additional investigation to determine feasibility, but have large potential for decarbonization.

Renewable option	Description
On-site generation	Investigate renewable energy generation on site including solar, wind geothermal and biomass solutions.
	Inventory potential future solar housing locations and available capacities.
	Indoor recreation centres have high potential for heat recovery.
Community Partnership Opportunities	Explore technological advances / engage community partners for more cost effective capture of excess biogas from neighbouring wastewater treatment plants, for use in space heating and domestic hot water. Past investigation led to insufficient business case.
	Joint district heating and cooling applications for waste heat to energy capture.
	Pursue new technological growth in local tech and energy sectors to create partnerships and support community growth. Exploring the transition to fuels such as hydrogen and ammonia could provide opportunities for collaboration.
Energy Storage	Investigate energy storage solutions to shift demand, as well as optimize pricing structure changes for EV charging.

Agreements

The City holds agreements of the following nature, in promotion of energy conservation and community impact.

Oshawa Power

Combined Heat and Power

The installation at the Delpark Homes Centre in Oshawa allowed for use of existing infrastructure and facilitates local generation for use in emergency situations. The active agreement has provisions for islanding of essential services, adding resiliency to the facility's designation as an emergency evacuation center.

Solar Panel Housing

The agreement between the City of Oshawa and Oshawa Power contributes to municipal renewable energy generation by housing PV solar arrays that are owned and operated by Oshawa Power on City of Oshawa's roof structures. These PV systems are located at Civic Recreation Complex, Delpark Homes Centre, Tribute Community Centre, Donevan Recreation Centre, and the Oshawa Power Admin buildings that are owned by the City of Oshawa.

Toronto Atmospheric Fund – EV Charging Funding

Toronto Atmospheric Fund (T.A.F.) invests in urban solutions to reduce greenhouse gas emissions and air pollution. In 2022 through partnership with regional municipalities the City of Oshawa and other regional

partners entered into agreement with TAF to receive federal funding for public use EV Charging installations.

Consultants

WattsWorth Analysis Inc.

Oshawa uses WattsWorth's services for electrical consumption monitoring and trend analysis.

Blackstone Energy Services Inc.

The City's agreement with Blackstone is two-fold, including natural gas procurement management and analysis services for those accounts included in the gas procurement pool.

Technical Advisory Contracts

The City of Oshawa holds agreements to gain technical expertise on the following energy related items, on an as needed basis:

- Energy Auditing
- Feasibility Studies
- Contract Scope definition for Energy Conservation Measures
- Energy Saving Projections
- Detailed Engineering Studies

Results of Grants and Incentives (2018-2022)

The City of Oshawa aims to improve our readiness to pursue energy related grants and incentives, through implementation of our measurement, verification and metering strategies.

Electric Vehicle Charging Funding \$88,000

Energy Incentive Totals \$219,217 +

IESO Energy Manager Program
\$103,480 in incentives in addition to consumption savings of 2,587 MWh/year.

Community Partners

The City of Oshawa is committed to creating positive impact within the community, through sustainable leadership and responsible collaboration. A low carbon future for our community requires ambitious restructuring of priorities and shared ownership of the goals. The City is fortunate to have community partners who are pro-active in developing energy conservation in their culture and pursuits. This plan's Net Zero targets will promote innovation and continue to invite exciting partnerships.

Oshawa Power

Oshawa Power is rooted in the history of Oshawa's progress as a city. As leaders in distributed energy resources, Oshawa Power has shared their expertise to support the City of Oshawa's energy projects over the years. As outlined briefly in the agreements section of this plan, recent projects have included the installation of a combined heat and power (CHP) plant, and photo-voltaic installations on five City of Oshawa's buildings.

Recent commissioning of the CHP plant has confirmed the islanding ability for the Delpark Homes Centre. Local generation of electricity creates sources of energy redundancy at this facility, allowing for the added resiliency of the facility as an

emergency evacuation centre. When operational, the waste heat from the CHP is used to reduce loads for the facility's domestic hot water.

Educational Institutions

Oshawa is home to Durham College, Ontario Tech University, and Trent University's Durham GTA. The City of Oshawa currently partners with Durham College, Ontario Tech University, Trent University Durham GTA and the University of Toronto, Department of Civil and Mineral Engineering through the TeachingCity program. As a TeachingCity, collaboration with these educational institutions to develop new technologies, share access to facilities, resources and equipment and become a recognized community of research and learning. Past programming has focused on corporate energy management planning, helping to deliver the past C.F.E.M.P.



Recognizing tech and power generation as pillars in both Oshawa's community and education sectors, the City of Oshawa aims to expand these partnerships as our decarbonization strategy continues to develop.

Durham Region

The Regional Municipality of Durham is a two-tiered municipal government, and is comprised of eight lower-tiered local municipalities; Uxbridge, Brock, Scugog, Clarington, Oshawa, Whitby, Ajax and Pickering (Figure 20)¹³. These neighboring cities and towns form a valuable team, exhibiting a strong energy conscious direction that the the City of Oshawa is proud to play a role in.

Durham Region has built a robust low carbon strategy through community and corporate standards, which help to inform the direction of our local municipal efforts.

- The Durham Community Energy Plan
- The Durham Standard (Corporate Construction)
- Electrification of Regional Transportation
- District Energy Studies

Figure 20. Map of Durham Region's local municipalities.

¹³ UReach Toronto, 2023

Asset Management

Operations and Maintenance

The City of Oshawa relies on internal staff as well as independently organized operators to maintain and operate its public facilities. These teams work together to organize resources, best practices and procedures to ensure City facilities remain in excellent quality. Understanding energy efficiency and how it can best be delivered through maintenance and operational protocols requires awareness, training and access to functional relevant data. Energy efficiency involves using technology and tools that require less energy to perform the same functions, and understanding where opportunities exist in M&E systems. Energy conservation similarly requires education, but can be achieved through behavioural awareness and habit changes.¹⁴

Often new technologies come with secondary advantages to energy efficiency and payback benefits such as reduced maintenance needs, more user friendly interfaces, and automation. Operator and skilled trades' recommendations will help to dictate how these technologies can best be integrated for success. Ideally having the staff working group help define and implement energy efficiency measures (EEMs), will result in a strongly engaged team. A continual line of communication with the energy team will help these operators turn information into action, and can optimize operational tools that are available to staff and contractors.

Operators are tasked with balancing the functional needs of the occupants, while also looking for maintenance and energy efficiencies. Applicable ASHRAE standards such as "Standard 180 – Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems" establish minimum requirements to preserve a system's ability to achieve energy efficiency while maintaining indoor air quality and thermal comfort. The coordinator of these elements requires planning, education and adequate technical support.¹⁵

The priority measures for O&M energy efficiency and conservation recommended under this plan are;

- Energy skills training;
- Building automation systems (BAS);
- Re-commissioning; and
- Automated optimization.

¹⁴ Martin, 2019, p. 35

¹⁵ American Society of Heating, Refrigerating and Air-Conditioning Engineers, 2018

O&M	Considerations	Impact of implementation	Plan for delivery
Energy Skills Training	• Review/confirm current training and qualifications of staff • Building Environmental Systems (BES) Operator Training / Refresher • BAS specific training • Energy Efficiency Maintenance courses • Resources to help inform operators	Good energy efficiency practices require an understanding of how systems are integrated and respond dependently. Technology specific training allows the complexities of BAS and integrated systems to be an asset rather than a barrier to good energy performance.	1. Use the Staff Working Group meetings to determine key areas of opportunity for learning.
			2. Identify training that best suits gaps in knowledge for the operations staff. Implement training with staff working group, and define any other relevant staff.
			3. Develop procedure for continued training to be integrated into maintenance contract schedules of select systems and BAS.
			4. Isolate qualified individuals for specific technical training, and/or resources.
			5. Annual review of skills and opportunities for future training.
Building Automation Systems	• Integrate analytics into BAS performance • Combine BAS platforms for one integrated approach • BAS specific training • Standardize and streamline future	Disparate BAS systems increase the amount of time and effort it takes for operators and users to build their knowledge, especially when looking across multiple systems for energy trends. Building in compatibility between the existing and new BAS systems will increase operator response time and the	1. Reference capital assessments for progress on BAS technologies and integration tools.
			2. Investigate compatibility of BAS technologies with metering, utility greenbutton outputs, and IoT devices. Ideally developing one system that makes energy data accessible to operational staff, as well as allowing for streamlined energy auditing and planning.

O&M	Considerations	Impact of implementation	Plan for delivery
	BAS specifications • Integrate BAS with energy metering and energy software goals	ability to make informed energy decisions. Data analysis and energy management go hand in hand. Currently there is no link between operational data and energy data, proving to be a limiting element in achieving our energy management potential in operations and planning.	3. Investigate BAS upgrades to provide analytics on existing systems. (to be coordinated with #2)
			4. Detail and integrate BAS energy efficiency consideration into design specifications.
			5. Identify energy focused BAS training, for the operators, as a critical success factor in new system installations and include BAS training in routine service contracts with BAS providers.
Re-commissioning	• Re-commissioning built into maintenance every 3-5 years • Establish energy standards for commissioning procedures • Ensure maintenance involves KPI to indicate need for commissioning • Training of operators	Proper commissioning is a building management best practice. Critical energy savings can be realized by undergoing the re-commissioning process, sometimes correcting operational inefficiencies that were not caught in the original installation. Accredited building commissioning providers will identify energy conservation measures and train operators to engage in ongoing commissioning. Benefits include reduce maintenance and energy costs, and increased lifespan.	1. Review current re-commissioning procedures with Staff Working Group, collect feedback.
			2. Investigate logistics and funding for including a re-commissioning element into the energy audit program.
			3. Investigate use of re-commissioning grants and incentive programs that are offered for existing buildings.

O&M	Considerations	Impact of implementation	Plan for delivery
Automated Optimization	• Standardize set points • Utilize photocells for ambient lighting minimums, and occupancy sensors • Free cooling optimization • Optimizing through operational analytics • HVAC optimization • Review scheduling of systems	Building automation systems provide automation, however standardizing and analyzing the results can produce more efficient delivery. This also helps to predict energy baselines. Optimizing automation is a continual process, with specific considerations needed to the type of system, use of the environment, as well as impact on comfort. The considerations listed here indicate a starting point for general application to most facilities.	1. Review current automation settings with Staff Working Group, collect feedback.
			2. Establish where standards apply.
			3. Identify where no-cost measures can be implemented, and review BAS logs to identify priorities.
			4. Review cost-benefit of measures that would require operational and capital investment.

Quality Assurance

The quality assurance measures described in this section provide the framework for how we will achieve our energy targets, and maintain confidence in our results.

The top priorities for progressing the City of Oshawa's energy management strategy are outlined below;

- Obtain consistent, accurate energy consumption and expense data;
- Automate energy data collection to optimize people resources for analysis and action of energy initiatives; (provide effective energy tools)
- Better utilize building automation systems for energy data collection, energy efficient programming, real-time monitoring, and operator awareness;
- Track significant energy users specific to each facility;
- Develop and maintain baseline energy profiles for each facility, to monitor and log energy trends;
- Systematic identification and quantification of energy efficiency measures (EEMs); and
- Integrate qualifying parameters for energy specifications into capital planning and project contracts.

Energy Management as a System

The importance of effective energy management has evolved drastically over the past decade since the development of the first Corporate Facilities Energy Management Plan. Many systematic approaches to effectively evaluate and improve energy performance have standardized industry expertise, and are available to guide energy conscious operations. According to the Clean Energy Ministerial (CEM) Energy Management Working Group, energy management systems have the potential to save up to 40% of the total energy use in commercial buildings.¹⁶ Natural Resources Canada recognizes ISO 50001 as an effective approach, and in the past has offered funding associated with adoption of this program.

¹⁶ Natural Resources Canada, 2023

“The ISO 50001 Energy Management Systems Standard is an internationally recognized voluntary standard that gives organizations a structured framework to manage energy. ISO 50001 integrates energy efficiency into management practices to increase awareness of energy use, reinforce good energy management behaviours and make better use of existing energy-consuming assets and processes. It also helps organizations to evaluate and prioritize the implementation of new energy-efficient technologies”.¹⁶

The ISO 50001 Ready Program has been developed by Natural Resources Canada to assist organizations in implementing energy management systems for their vertical assets, without full adoption of the ISO50001 requirements. The program provides the opportunity for recognition by completing 25 tasks. These tasks include checklists, considerations of risk, and best practices. Recognizing that not all elements of the 25 point program directly align with the City of Oshawa’s current priorities, the relevant tasks in this program will be identified and used as a resources in delivering the listed quality assurance measures. As the energy management system within the City of Oshawa develops, satisfying either ISO 50001 Standard requirements, or all ISO 50001 Ready Program steps will be reviewed for added benefits.

Quality Assurance Measures

Energy Audit Program

Historically, the City of Oshawa has utilized external energy audits intermittently to identify the strength of specific energy opportunities. The adoption of a facility audit schedule, and energy audit standard is a suggestion carried forward from the past plan. This addresses the missed energy opportunities when a systematic approach is not implemented. Audit programs improve tracking of building specific performance, and are a component of establishing baseline operation.¹⁷ The facilities energy team will select the appropriate audit standard with consideration given to the c, and Standard 211-2018 - Standard for Commercial Building Energy Audits. The audit program will define where level 1, 2, or 3 energy audits are assigned. Audits will be used to identify critical energy consumers, analyze consumption profiles, trends in peak demand operation, and will investigate energy rates for financial opportunities. Significant end uses (SEUs) will be targeted for energy performance evaluation.

Outcomes associated with building energy audits include:

- Optimization of set points, dead bands and standard seasonal automation settings
- Understanding the load profiles of key end use mechanicals

¹⁷ American Society of Heating, Refrigerating and Air-Conditioning Engineers, 2011

- Load shifting off of peak demand timing
- Identifying right size specifications for future capital planning
- Generate capital improvement projects for energy conservation
- Reduce energy costs through operational changes, energy commodity contract changes, or behavioural changes
- Encourage communication with operators and end users to understand operational trends

QA Measure	Inclusions	Impact of implementation	Plan for delivery
Energy Audit Program	• Audit Schedule • Audit Standard • Internal audits • External audits (delivered by others) • Documentation and discussion with operators	An energy audit program will deliver consistent evaluation of the state of energy efficiency for each facility asset, and build a reference of energy related documentation for each facility. Energy conservation opportunities for immediate action where possible, or alignment with capital budget.	Energy Audit Program to be initiated in 2023/2024. Audits will operate on a rotating schedule of phases, with priority and redundancy given to the following types of assets as needed.
			1. Critical Infrastructure (Emergency Evacuation Centre, Fire Halls, City Hall, Operations Depots)
			2. Buildings with increasing Energy Use Intensity
			3. Buildings with specific capital interest for upcoming years

Measurement and Verification

Energy savings in a facility are not easily quantifiable, because savings represent the absence of consumption or demand. Quantifying savings based on measurements in energy use, before and after implementing a project is the most accurate way to measure the real impacts of an energy project. The process of doing this is referred to as measurement and verification (M&V). M&V is fundamental to energy efficiency financing, energy performance contracting, energy performance management, GHG accounting efforts, and many government and utility programs.¹⁸

The International Performance Measurement and Verification Protocol (IPMVP) is recognized as a best practice methodology to ensure that the savings and impact of energy efficiency and sustainability projects are accurately measured and verified. The protocol is mostly non-prescriptive, and allows adaptation to suit each energy project's needs.

IPMVP provides a framework that is used to verify that a project has the potential to perform and save energy, and quantify site-level energy and cost impacts from a targeted project. Both of these components are essential to the measurement and verification (M&V) of savings.

Furthermore, without proper M&V the following challenges have been identified;

- Insufficient data is available to make informed decisions on energy efficiency measures and how they will impact the operational loads in the City of Oshawa's facilities.
- Inability to pursue funding and grant opportunities that would significantly advance the City of Oshawa's ambitious greenhouse gas reduction targets, and optimize on federal infrastructure investments for our community.
- Lack of clarity on actual savings achieved, necessitates systematic approach to capturing consumption metrics prior to project initiation.

Training offered through the Canadian Institute for Energy Technology (CIET) for the Certified Measurement and Verification Professional (CMVP) or comparable training is recommended for qualified energy staff. This training will ensure proper considerations are made when developing and facilitating M&V plans.

Energy metering is a critical element of proper measurement and verification. The City of Oshawa does not currently meter any energy consumption in addition to the facility installed utility meter. A portable electrical clamp monitor is used for

¹⁸ Efficiency Valuation Organization, 2023

electrical consumption monitoring of pre/post project loads, although this approach has limitations in accuracy and does not provide certified results required for funding opportunities. A metering strategy is recommended to clearly define the types of meters that may be utilized, (sub-meters, power meters on significant projects, or hourly interval meters) and when to do so. Other municipalities have implemented thresholds to include metering with retrofit projects. For example, the City of Markham installs a power meter with retrofit projects where anticipated electrical cost savings exceed \$10,000.¹⁹

M&V procedures for many energy incentive and grant programs require an “approved meter” to be used to define the project boundaries. Meters that meet Measurement Canada requirements for revenue billing, that have been tested and sealed and had a Measurement Canada S-E-04 inspection are typically required.

QA Measure	Inclusions	Impact of implementation	Plan for delivery
Measurement and Verification Standards	• Measurement and Metering Technologies • Formal M&V plans for significant energy projects • Design M&V plans according to IPVMP • Energy Metering Strategy • Training of Qualified Staff	Supporting energy management with measurement and verification practices reduces risk in energy planning, allows for informed decision making, while encouraging duplication of successful projects. Metering technologies measure energy consumption of a defined project boundary or sub-meter at the facility level when energy data is not available at the required interval or accuracy from the utility. M&V plans with metered consumption are required for many incentive and grant applications, with the potential to provide ongoing funding for future energy conservation measures.	1. Standardize an M&V protocol for energy projects, following IPVMP standard.
			2. Develop energy metering strategy that incorporates estimated costs, metering types, thresholds for installation and compatibility with the City’s planned method for energy data presentation.
			3. Have qualified energy staff take measurement and verification training.

¹⁹ Martin, 2019, p.20

Processes and Procedures

QA Measure	Inclusions	Impact of implementation	Plan for delivery
Processes and Procedures	• Life Cycle and Capital Planning • Specification Standards • Budgetary Inclusions • Energy Related Project Delivery Processes • Procurement Processes	Integrating an energy management component alongside existing processes and procedures will help to elevate decarbonization efforts. Processes should include responsibilities for all relevant staff, encouraging repeatability and creating strong engagement across the organization.	1. Collaborate with respective teams to align existing processes and procedures with energy management.
			2. Create an implementation timeline, with hierarchy of focus. Start small and build out the processes to be more involved.

Data Analysis

QA Measure	Inclusions	Impact of implementation	Plan for delivery
Data Analysis	• Maintain baseline database for each facility • Routine and systematic review of billing • Routine analysis with consultants • Benchmarking with regional and provincial municipalities • Automate where possible	Data analysis supports capital decision making and development of energy efficiency measures to reduce consumption. A current limitation is a lack of regular assessment and data trend collection. This limitation is mostly due to lack of automation in the City's data collection and analysis systems. Energy management software will play a key role in optimizing data analysis and expanding the potential of the City's energy team.	1. Establish baseline data sets and systematic review of measured parameters. 2. Establish Key Performance Indicators (KPI) for each facility. 3. Define opportunities for data sharing and make data available to all identified staff.

Energy Management Software

QA Measure	Inclusions	Impact of implementation	Plan for delivery
Energy Management Software	• Integrate multiple forms of data collection into one system • Allow for automation • Real time optimization • Efficient Reporting • Link BAS data to consumption data	Eliminates the need to compile data from multiple locations before performing analysis. Reduces the maintenance required to upkeep various databases of energy information. Energy management software will allow staff to better understand consumption data, and spend time looking for efficiencies rather than on tedious inputs. Energy management software encourages the operational staff and the energy team to share access and provides transparency between how similar facilities compare.	Investigate software technologies including the option for a BAS analytic layer described in operational measures. Solutions should accommodate the presentation of utility data, IoT devices, interval metered data, as well as BAS outputs and provide configurable data analytics.

Capital Investments

Aligning capital investments with the long-term energy strategy maximizes resources and benefits of all projects delivered. Three types of capital investment are necessary to advance decarbonization within the Corporation of City of Oshawa;

1. Decarbonizing through defined energy standards applied to all capital projects at design and delivery levels;
2. Investments in energy technologies for auditing, measurement and verification, automation and analysis; and
3. Capital investments in energy specific projects to advance corporate goals of decarbonization.

Corporate Facilities Green Building Standard

Green Building Standards are being developed globally at all levels of oversight including federally, regionally and for both municipalities and corporations. These standards provide a prescriptive framework for building design, construction, renovation and maintenance procedures that reduce non-renewable energy consumption.

It is recommended that the Oshawa Corporate Facilities Green Building Standard be created to prescribe guidelines in the following areas:

- New construction
- Retrofit to existing construction
- Maintenance replacements

The 2030 Energy Reduction Plan defines the carbon footprint of buildings requiring a “whole-of-government and whole-of-economy effort focusing on regulatory, policy, investment, and innovation levers” in order to drive decarbonization.²⁰ The Canada Green Building Strategy was developed in July 2022 in accordance to the 2030 E.R.P., defining various areas of support that the federal government is extending to transform Canada’s built environment. The Corporation of City of Oshawa will aim to develop our Corporate Facilities Green Building Standard to utilize the programs made available. Development of the Corporate Facilities Green Building Standard will include, but not be limited to, reference of the following standards;

- Durham Region Design Standard 2023;

²⁰ Environment and Climate Change Canada, 2022

- National Energy Code for Buildings 2020;
- LEED BD+C New Construction v4.1;
- LEED O+M Existing Buildings v4;
- Canada Green Building Council Zero Carbon Building Standard v2;
- Available municipal Green standards (i.e. Whitby, Toronto, Mississauga, Vancouver);
- American Society for Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) Standard for The Design of High-Performance Green Buildings Except Low-Rise Residential Buildings (ASHRAE 189.1 – 2017)(ASHRAE);and
- Canadian Green Building Council's Zero Energy Performance Index (zEPI).

Funding

Responsible allocation of municipal resources is of the utmost importance and remains a priority consideration for energy management expenditures. Advancing the City's greenhouse gas reduction targets, and energy conservation measures is an endeavor that returns on investment through energy cost avoidances, and transforms the City's assets to avoid future financial risk. Energy related projects are normally funded by the Revolving Energy Fund (R.E.F.) Reserve and the Canada Community Building Fund. In future, it is recommended that an increase in funding be considered, to ensure the progress indicated in this plan is achieved, and the financial benefits of energy efficiency are realized to their full potential.

Revolving Energy Fund Reserve

In 2018, the City's R.E.F. Reserve was approved as a method to financially support energy conservation projects and initiatives. The reserve is populated by 100% of the energy efficiency project incentives received, as well as 100% of the utility and maintenance cost avoidances realized during the first year following project implementation. Utility savings deemed to be associated with energy projects, and avoidances through management of rate structures are also contributed to the fund. Future reductions are then absorbed in the second year of operation as savings to the operating budget.

Energy projects that support the goals of the C.E.M.P., and meet simple payback criteria of 10 years or less, can be submitted for approval through the annual capital budget process. At this time, withdrawals from the reserve may not exceed

10% of the uncommitted balance, which has encouraged the accumulation of funds since the creation of this reserve. The balance of the reserve as of December 31st, 2022, is \$1,343,592. This total amounted from the savings and incentives delivered by energy projects between 2018 and 2022.

Approval for appropriate measures outlined in this plan will be submitted as capital funding requests from the R.E.F. Reserve for Council approval through the annual budget process.

Canada Community Building Fund

The Canada Community Building Fund was previously known as the Federal Gas Tax Fund. It provides a source of funding to provinces and territories, who in turn flow this funding to their municipalities to support local infrastructure priorities.²¹ The delivery of this fund is facilitated through the Association of Municipalities of Ontario. Energy projects fall into the community energy systems, fire hall, recreation, or capacity building categories for funding, depending on project scopes.

Capital Projects

Capital investment in energy projects from 2018-2022 contributed to reduced energy intensity of 14.4(kBtu/ft²), compared to the 2017 baseline.

Capital alignment with energy investments has allowed coordination between equipment at end of useful life, with energy upgrades to serve a dual purpose of advancing energy conservation measures while investing in scheduled asset renewals.

²¹ Association of Municipalities of Ontario, 2023

Table 13. Capital Energy Projects delivered (2018-2022)

Project Type	Locations	Annual Energy Reduction
LED Lighting Upgrades and De-lamping	PG1 Centre St Parkade	TBD
	PG3 Mary St Parkade	TBD
	Northview Community Centre	TBD
	Delpark Homes Centre	1232 MWh
	Fire Hall 1	34 MWh
	Fire Hall 3	27 MWh
	Fire Hall 4	5 MWh
	Animal Services	4 MWh
	Civic Recreation Complex	26 MWh
	Tribute Communities Centre	383 MWh
	Harman Park Arena	TBD
	Donevan Recreation Complex	TBD
	South Oshawa Community Centre	TBD
BAS Upgrades / Lighting Controls	Delpark Homes Centre	200 MWh
	Harman Park Arena	36 MWh
	Consolidated Operations Depot	35 MWh
HVAC Retrofits		
<i>HVAC System Retrofit Boiler Replacement</i>	Animal Services	5 MWh
<i>VFDs /scheduling</i>	City Hall	18 MWh
<i>HVAC Efficiency Upgrades Chiller Replacement</i>	Civic Recreation Complex	103 MWh
<i>Dehumidification Units Upgrade</i>	Delpark Homes Centre	19 MWh
<i>RTU Upgrade</i>	Airport	51 MWh
<i>HVAC Redesign/ Building Envelope</i>	Fire Hall 1	31 MWh
Ice Plant Optimization	Tribute Communities Centre	TBD
Waste Heat Recovery	Donevan Recreation Complex	439 MWh
	Delpark Homes Centre	25 MWh
		24 MWh

Summary of cost avoidances delivered to the City of Oshawa by facility projects in Table 13, are indicated below:

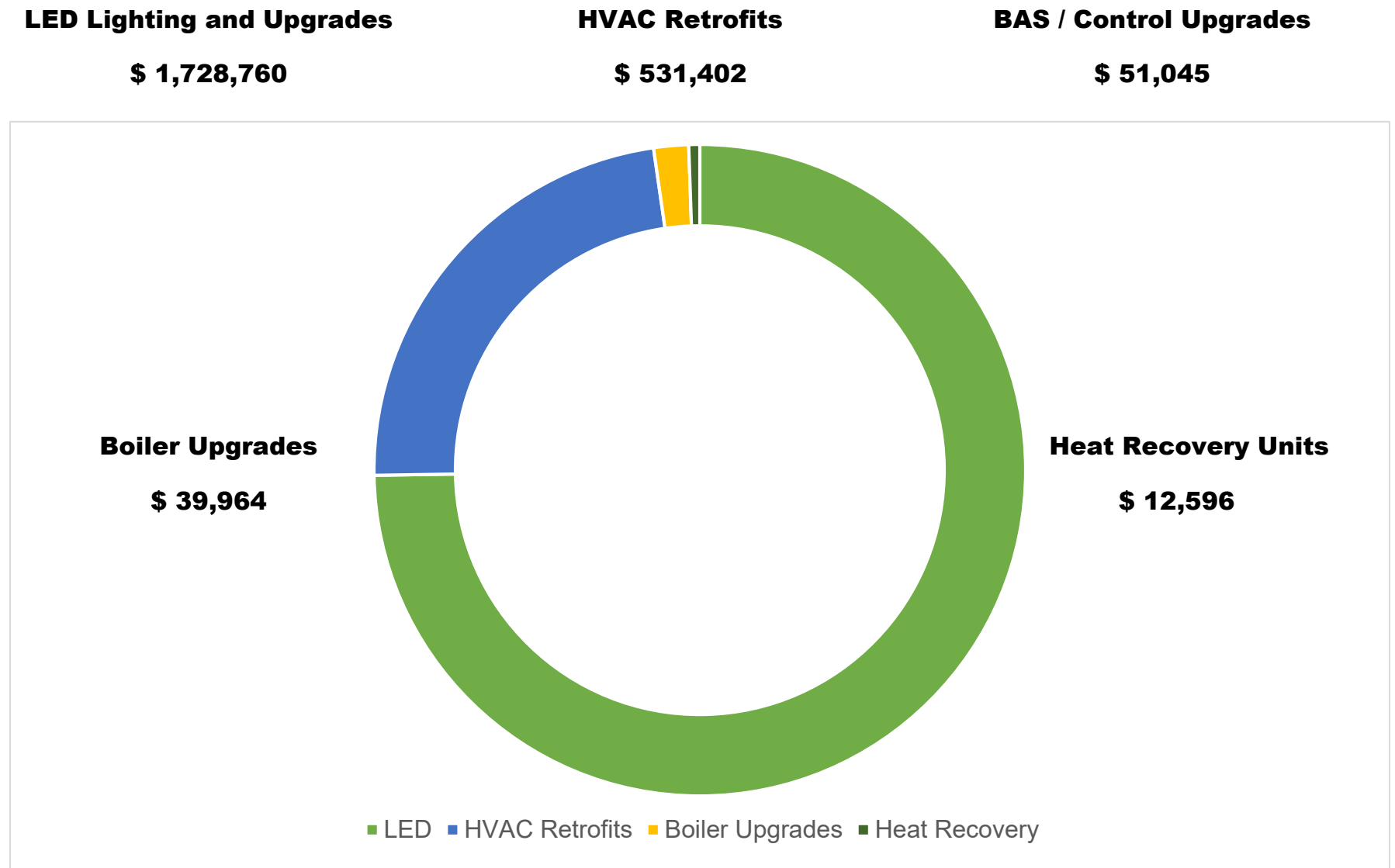


Figure 21. Summary of cost avoidances from facility capital projects (2018-2022)

Table 14. Current Energy Related Capital Investments

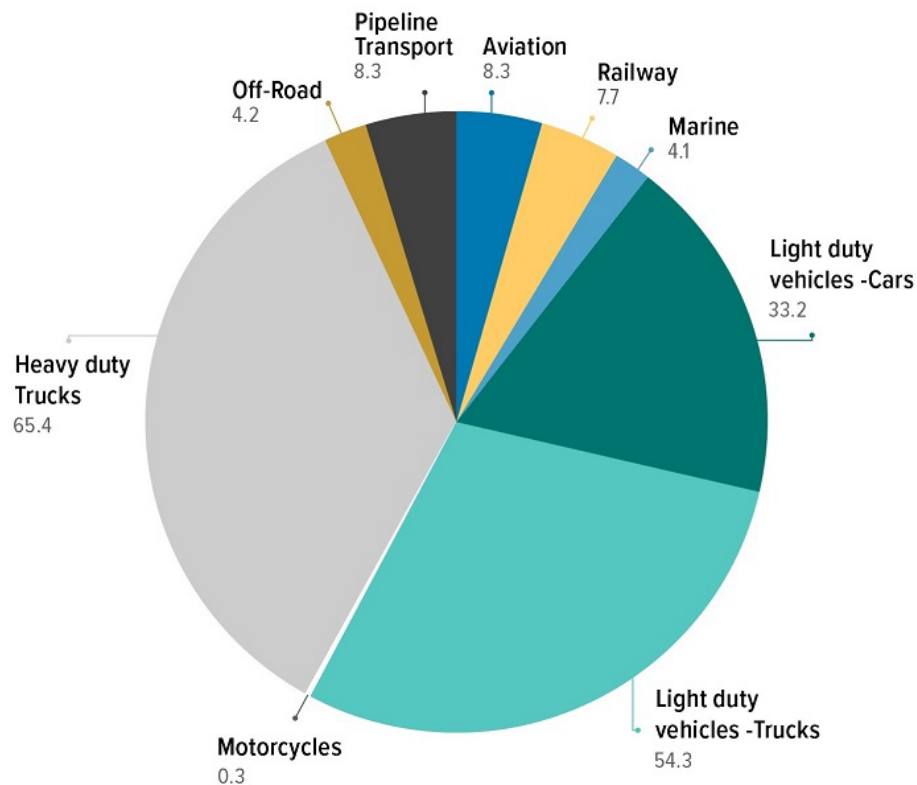
Capital Investments	Description	Project Budget	Anticipated Energy \$ / Impact
Fire Hall 4 HVAC Replacement	Replacement of original HVAC infrastructure from 1981.	\$1,200,000	cost avoidances of \$4,000/year, plus reduced maintenance
Fire Hall 1 HVAC Retrofit	Upgrade to boiler and retrofit of HVAC and air distribution system.	\$1,600,000	cost avoidances of \$5,300/year (34,500 KWh)
Fire Hall 1 Building Envelope Improvements	Replace select aluminum windows, and door system.	\$200,000	cost avoidances of \$4,500/year (30,000 KWh)
Lighting Replacement Program	Rolling program with the 2023 budget allocated for retrofit of the select lighting at City Hall.	\$50,000	cost avoidances of \$1,650/year (15,000 KWh)
Northview Library Lighting Upgrades	Upgrade of original facility lighting from 1986. Fixtures are obsolete and inefficient.	\$200,000 (Phase One)	cost avoidances estimated at \$4,250/year (35,000 KWh)
Mary Street Leasehold Improvements HVAC Upgrades	Retrofit of original electrical heating and cooling system. New air to air heat pumps installed with remote condensing units.	\$300,000	cost avoidances estimated at \$22,478/year (112 MWh)
Electric Vehicle Charging Stations	Installation of one dual charger at the City Hall west parking lot.	\$100,000	Carbon emissions reduction of approx. 6,250 KgCO ₂ e/year. Promotes EV conversion through corporate culture.

Capital Investments	Description	Project Budget	Anticipated Energy \$ / Impact
Building Condition Audits (assessments)	Ongoing program that delivers life cycle analysis of facilities, incorporating each vertical asset within a two year phased approach. Potential energy savings identified as a secondary benefit of this program.	\$150,000	TBD - Items with energy conservation opportunities are flagged for further assessment
Energy Audits (assessments)	Internal/external audits to be performed this year, initiating the energy audit process described in the QA section of this plan.	approx. \$50,000	TBD by results of audits

Electric Vehicle Charging Stations

The Energy Reduction Plan (E.R.P.) for 2030 has developed a “light duty vehicle (LDV) zero emission vehicle (ZEV) mandate, which will set annually increasing requirements towards achieving 100% LDV ZEV sales by 2035, including mandatory interim targets of at least 20% of all new LDVs offered for sale by 2026 and at least 60% by 2030”.²² The impact of transforming the light duty transportation sector alone is noted to have potential for 48% reduction of transportation sector emissions. Infrastructure to support charging of these vehicles is essential to this transition for residents and the City of Oshawa alike.

Figure 22. Emissions of Canada’s transportation sector by vehicle type, 2019 (Mt CO₂e)



The figure demonstrates 88 Mt CO₂e reduction of Canada’s transportation sector emissions that would be achieved in the full transition to light duty new zero emission vehicles.

The City of Oshawa installed 16 level two charging stations (14 of which are public facing) as a capital project in 2022.

\$88,000 of funding was received through Canada’s Zero Emission Vehicle Infrastructure Program, facilitated through TAF as outlined in the agreements section of this plan.

²² Environment and Climate Change Canada, 2022

Table 15. Location and Use of City of Oshawa's Public EV Charging Stations

Parking Location	Station ID	Total Sessions	Average Session (Minutes)	Total Session (Minutes)	Total Energy (kWh)
Civic Recreation Complex	AAB-21780	279	210	25,337	1260.301
Civic Recreation Complex	AAB-21767	175	161	13,759	950.629
Consolidated Operations Depot	AAB-21768	77	387	14,704	968.593
Consolidated Operations Depot	AAB-21772	169	436	29,196	2342.32
Delpark Homes Centre	AAB-21770	423	239	50,273	3538.736
Delpark Homes Centre	AAB-21777	546	171	46,318	3180.252
Parking Garage 1 - Centre St	AAB-21764	392	181	35,356	2163.225
Parking Garage 1 - Centre St	AAB-21754	152	174	15,050	970.369
Parking Garage 2 - McMillan	AAB-21774	62	291	10,240	758.278
Parking Garage 2 - McMillan	AAB-21776	22	150	1,585	64.924
Parking Garage 3 - Mary St	AAB-21762	162	319	26,021	2017.844
Parking Garage 3 - Mary St	AAB-21759	195	262	24,985	1466.801
South Oshawa Community Centre	AAB-21775	185	161	14,778	853.318
South Oshawa Community Centre	AAB-21781	151	194	14,752	1002.009
	Totals	2990	209	322,354	21,537.60

The totals shown in this figure represent charging data from the time City of Oshawa chargers were made operational in August 2022, until the end of Q1 2023 (March 31, 2023).

According to 2022 review of electric vehicle charging station municipal data, the City of Oshawa has seen the highest total number of sessions per EV charger made available by a municipality in the region.²³ The total amount of kWh charged is also the second highest per charger (following Clarington) despite only being operational for half the amount of time when compared to the other chargers in the Region. These numbers are in reference to the chargers installed by the City of Oshawa and do not include other EV chargers installed throughout the city.

²³ Town of Whitby, 2023

This may be explained by the City of Oshawa being the only municipality which is operating without charging fees.

As the initial phase of this EV charging pilot program appears successful, review of charging fees is recommended. It is suggested that a portion of potential future fees be considered for re-investment in the Revolving Energy Fund Reserve, advancing the Net Zero strategy of the City. This strategy is currently modelled in other municipalities, where session charges are made to exceed electricity costs.

Limitations of continuing not to charge a fee include:

- No offset of operation and maintenance costs incurred by the City
- Individuals using the City's chargers as personal chargers, occupying for the duration of the day and reducing community availability
- Current EV owners are typically able to afford the cost of fueling (issue of equity for municipal investment)

The City of Oshawa will rely on industry expertise and continued analysis of local charging data to determine appropriate thresholds for when rates may be proposed.

It is understood that EV ownership and demand for municipal chargers will increase as EV supply and market uptake change. In the interim it is recommended that the City of Oshawa explore sponsorship opportunities to cover operational and maintenance deficits that are incurred. Similar sponsorships have been received by utility partners in other communities.

Fleet Services

The following items were set out as G.H.G. reduction measures for Fleet Services in the Corporate G.H.G.R.P.

Table 16: Fleet Services - Corporate Greenhouse Gas Reduction Initiatives

Item	Description	Status
(#3) Fleet optimization	Determine optimal routes for fleet vehicles and undertake corrective maintenance	Ongoing
(#10) Use of renewable fuels	Use renewable fuels where feasible	Returning to lower emission fuel B10
(#12) Fleet upgrades	Vehicles replaced and right sized with more energy efficient models. Purchased hybrids where feasible	Procurement of Electric Vehicles and EV charging stations in progress
(#31) Fuel cells and alternatives fuels	Investigate fuel cell technology for City fleet vehicles, propane, natural gas, ethanol, biodiesel and electricity	Conversion kits purchase and installed in 10 vehicles. 10 hybrid drive MLE vehicles employed.

Updated on #3 – Fleet Optimization

Ongoing as we continue to leverage new data captured from our GPS system.

Updated on #10 – Use of renewable fuels

Returning to the use of B10 this spring.

Updated on #12 – Fleet Upgrades

In the fall of 2022, the City submitted EV charging infrastructure project details to NRCan in hopes of obtaining subsidy funding totaling an additional \$400,000 on top of the already approved project funding of \$500,000 in the 2022 capital budget. Should this project gain federal support, Fleet Services plans to install 20 dual head level 2 chargers (40 charge plugs) and 2x 100amp level 3 chargers at the COD. Fleet Services has also issued purchase orders for its first 9 fully electric vehicles for receipt in the summer of 2023.

Updated on #31 – Fuel cells and alternative fuels

Beyond increasing our biodiesel content in warmer months and the upcoming adoption of fully electric vehicles, Fleet Services employed 10 hybrid drive special service vehicles in MLE (class 00) and 10 varied vehicles which were

converted to run on propane autogas. Since Jan 1, 2021 until Feb 28, 2023, G.H.G. reductions have totaled **169.88** Tonnes CO_{2e} from those 20 vehicles alone.

Table 17. Fleet Fuel Emissions by Fuel Source

Year	Type of Fuel	Consumption (L)	Cost	GHG Emissions (Tonnes CO ₂ e)
2022	Unleaded	263,379.56	\$373,966.74	605.45
2022	Diesel	664,829.26	\$1,092,223.48	1,816.49
2022	Propane	89,796.12	\$82,127.19	137.58
2022 Total		1,018,004.94	\$1,548,317.41	2,559.52
2021	Unleaded	302,700.23	\$316,339.02	695.84
2021	Diesel	586,979.36	\$624,175.69	1,603.79
2021	Propane	31,681.52	\$28,013.49	48.54
2021 Total		921,361.11	\$968,528.20	2,348.17
2020	Unleaded	325,238.03	\$263,894.73	747.64
2020	Diesel	601,392.57	\$507,065.35	1,643.17
2020 Total		926,630.60	\$770,960.08	2,390.81
2019	Unleaded	314,147.11	\$291,339.65	722.15
2019	Diesel	609,889.58	\$588,472.70	1666.38
2019 Total		924,036.69	\$879,812.35	2388.53
2018	Unleaded	455,024.32	\$461,629.67	1045.99
2018	Diesel	568,252.99	\$601,476.30	1552.62
2018 Total		1,023,277.31	\$1,063,105.97	2598.61
Grand Total		4,813,310.65	\$5,230,724.01	12,285.64

Fleet Fuel Emissions by Fuel SourceClear ULSD – 2.7kg of CO₂/L consumedGasoline – 2.3kg of CO₂/L consumedPropane Autogas – 1.5kg of CO₂/L consumed

Street lighting

As part of an investment grade audit performed in 2016 by Realterm Energy, the City of Oshawa investigated the inventory of high pressure sodium (HPS) street lighting and upgrade options. The results of the audit recommended appropriate light-emitting diode (LED) replacement fixtures for LED conversion, and implemented the conversion of existing HPS lightings in 2016 and 2017. The electrical savings associated with this change are detailed in Fig. 23 below, showing an annual reduction to the kWh load of 52%. The annual peak demand was also reduced by over 50%. The approximate cost avoidance in the year following conversion was \$825,000. This avoided consumption has been consistent since the conversion in 2017. Despite adding 1437 streetlights between 2016 and 2023, the cost for streetlight operation was approximately \$950,000 lower in 2022 than 2016 billing, with the majority of these savings attributed to the LED upgrades.

The annual inventory for streetlights in 2007 is estimated to be similar to last recorded inventory in 2009, apportioning the 92% of the 2016 load according to fixture counts, estimates 4,191,278 kWh of reduced consumption since 2007.

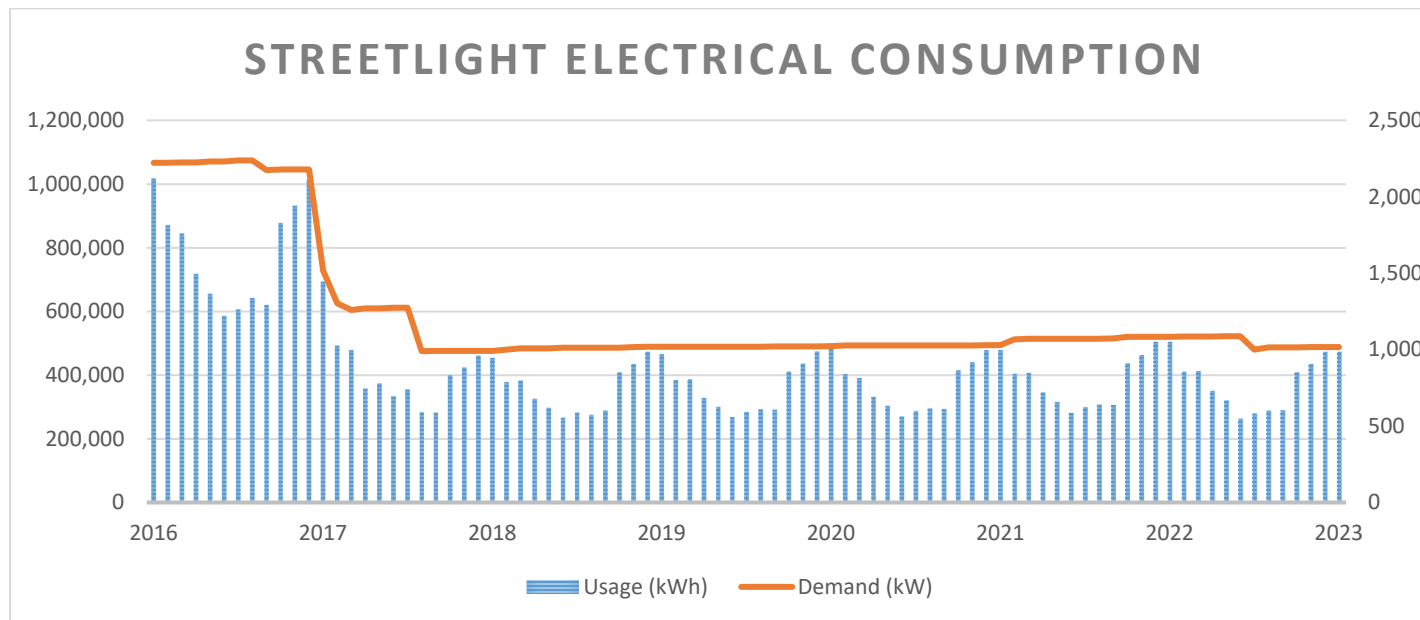


Figure 23. Streetlight Electrical Consumption (2016-2022)

Maintenance advantages

In general there are less maintenance costs associated with LED technology compared to the older HPS streetlights. LED streetlights last up to 20 years, require no routine maintenance, and have less components that can breakdown compared to HPS technology. Our LED streetlights installed during the City's conversion also came with a 10 year replacement warranty. In general, our streetlight maintenance calls were greatly reduced after converting to LED. Our LED warranty claims have remained within the range we expected, with no significant increase in LED failures.

HPS fixtures require routine maintenance including bulb re-lamping and lens washing every 4 yrs. Over a 20 year period, they would likely require a replacement ballast and/or starter.

The City is waiting for guidance on dimming regulation under the RP8 Street lighting Guide before exploring dimming strategies. Oshawa Power will also need to be consulted if guidance changes to allow dimming, as they approve the hydro metering utilized to calculate electrical consumption with dimming. This has been a roadblock for other municipalities as there is limited metering equipment that has been approved by utilities in Canada. It can be noted that all the City's streetlights are equipped with a 7-pin photocontrol receptacles which will allow them to accept dimming/adaptive control equipment in the future.

Solar Street Lighting

The City opted for the installation of a solar powered streetlight at the intersection of Given Road and Winchester Road East, in order to avoid costly install and potentially prohibitive review process that would be involved with extending Oshawa Power distribution lines at this location. Solar street lights are a green technology which are powered by batteries which are charged during the daytime by solar panels. The output from solar collection of this panel maintains performance during winter months, and allows the light to operate independently from the grid. As outlined by committee report CS-19-36, the investment by the City was approximately \$20,000, estimated to be a minimum of \$15,000 less expensive than the electrical grid powered alternative in this situation. The success of this installation encourages the exploration of solar lighting for future installations, as well as pilot projects to investigate solar lighting of trails.

Solar Parking Meters

Solar parking meters have replaced existing meters and been installed for all new meters since 2015. The option for remote pay through the “Honk” parking application is being utilized to reduce the carbon footprint of new parking meter installations in select locations. Parking pay stations in parking garages remain hardwired.

Parking meter inventory:

- Total number of pay by plate units with solar panel – 100
- Hardwired parking garage pay stations – 5
- Coin style city parking meters (no electrical) – 197

Summary of Recommended Actions

Focus Area	Action	Objective
Corporate Targets	Remain in line with 2030 federal and regional goals for 40-45% G.H.G. emission reduction from 2007 baseline.	To meet the goal of federal and regional alignment stated in the Oshawa Strategic Plan.
	Align with federal and regional goals to have Net Zero Emissions by 2050.	To meet the goal of federal and regional alignment stated in the Oshawa Strategic Plan.
	Establish tracking of full corporate emissions footprint.	To provide an accurate and complete assessment of corporate carbon footprint.

Focus Area

Action

Objective

Organizational Structure

Establish energy focused teams to support corporate carbon reduction activities and promote energy related partnerships, inclusive of:

The City of Oshawa Corporate Energy Advisory Team

Use the 2024-2028 term to establish a corporate energy team with the appropriate stakeholders to advance long term energy initiatives. This will support community collaboration on energy projects and future ideation of what is possible for the City of Oshawa.

Facilities Energy Management Steering Team

Management level team to support energy projects for mechanical optimization of facilities.

Energy Staff Working Group

Combining the efforts of energy management team and the operational personnel with an on-site focus for energy efficiency measures.

Focus Area

Action

Objective

Awareness and Education

Engage staff in energy awareness and education through i-Learn and i-Connect, and other educational means as relevant to their involvement in the City.

Strengthen the corporate culture of sustainability and produce energy conservation awareness.

Focus Area

Action

Objective

Net Zero Retrofit Strategy

Develop a Net Zero Retrofit Strategy targeting 80% of 2007 baseline emissions.

To create a strategy for active long term planning toward the targets that are proposed.

Define top consumers best suited for fuel switching.

Ensure the buildings with the highest potential for success, and least amount of risk are pursued for the Net Zero Retrofit designs.

Complete Net Zero Retrofit designs through detailed engineering studies.

Complete shovel ready designs allow for confidence in future compatibility of systems, which will require a staged approach for implementation, when making fuel switching decisions. Increased ability for planning, successful grant applications and capital asset renewal alignment.

Create roadmap for delivery.

Define technologies and key coordination requirements to align with mechanical functionality and project asset renewal.

Focus Area

Action

Objective

Capital Investments

Development of the Corporate Facilities Green Building Standard.

Reduce energy consumption and environmental impact by prescribing guidelines for new construction, retrofit construction and maintenance replacements.

Focus Area

Action

Objective

Capital Investments

Explore implementation of Electric Vehicle (EV) Charging rates and/or potential sponsorship.

To ensure the City is able to support EV uptake for the public, while not incurring maintenance deficits or large operational costs.

Investigate contributions to the Revolving Energy Fund Reserve from Electric Vehicle rates.

Contribute to future EV infrastructure or load reduction in facilities that can support the additional electrical load incurred to the facilities by the charging stations.

Focus Area

Action

Objective

Energy Commodities

Investigate financial benefits for hedging of electricity.

As market changes unfold, the way electricity is purchased is anticipated to change. The City of Oshawa should assess opportunity hedging provides for savings.

Assess methods of load reduction for demand cost savings.

Reduce the peak loading of facilities for fiscal benefit, grid reduction and increased capacity for facility operation within electrical service.

Fuel switching and natural gas load reduction.

Reducing dependence on natural gas aims to advance decarbonization goals, as well as prepare for future gas levies.

Assess renewable energy opportunities.

Assess renewable energy opportunities to support Net Zero Retrofit targets. Provide local energy generation, reducing grid consumption, source energy intensity and bills.

Focus Area**Action****Objective****Operations and Maintenance**

Automated optimization review and standards.

Review of current automation settings for optimized performance. Assess applicability of standards development for facility mechanical set points.

Integrate building automation systems with energy data.

Review methods to link data analysis with energy trends, providing energy staff and operators ability to analyze effectively.

Provide energy skills training for mechanical efficiencies.

Define gaps in knowledge for operational staff to support energy efficient practices. Invest in education and training.

Assess use of re-commissioning in maintenance plans.

Ensure maintenance of design conditions for efficient operation. Assess operational changes from design intent and adjust to promote efficient performance of mechanical equipment. Leverage funding opportunities available.

Focus Area

Action

Objective

Quality Assurance

Develop an Energy Audit Program to deliver consistent evaluation of energy efficiency opportunities.

Identify energy conservation opportunities for immediate action or alignment with capital budget.

Standardize measurement and verification procedure to support energy monitoring of facilities and projects.

Ensures quality of measurement and verification procedures delivered.

Provide measurement and verification training for qualified energy management staff.

Ensures quality of measurement and verification procedures delivered.

Develop a metering strategy that defines cost of metering technologies, presentation methods and thresholds to prescribe installation.

Allows for essential information to be collected about the impact of energy efficiency measures, increases repeatability of successful projects and allows the city to qualify for grants.

Integrate energy management into project delivery processes to have baseline energy prescriptions for projects.

To support the energy standards set in the Corporate Facilities Green Building Standard, as well as ensure grants and incentives are obtained.

Establish baseline data sets and a systematic review of measured parameters for each facility.

Establish KPI for each facility's operation to ensure energy efficiency opportunities are identified.

Create access to energy data for operational staff.

To inform and empower those individuals making mechanical decisions of the direct impacts on energy use.

Focus Area

Action

Objective

Corporate Fleet

Determine optimal routes for fleet vehicles.

Use renewable fuels where feasible.

Vehicles replaced and right sized with more energy efficient models.

Electric Vehicle infrastructure installation at Consolidated Operations Depot.

To reduce the emissions associated with the operation of City of Oshawa's fleet vehicles.

Support the electrification of fleet vehicles.

A. Capital Projects and System Retrofits

Item	Lead Department	Description	Status
Solar-powered parking meters	Community and Operations Services	Installed solar-powered parking meters	Completed 2010
Ameresco projects (and other identified energy efficiency projects)	Safety and Facilities Services, Economic and Development Services	Replaced heating, lighting, windows, ventilation and heating ventilation and air-conditioning (HVAC) systems at City Hall, the Arts Resources Centre, McLaughlin Library and Robert McLaughlin Art Gallery	Completed 2011
City Hall Revitalization Project (CHRP) LEED or comparable green building standard	Safety and Facilities Services, Economic and Development Services	CHRP built to LEED standard	Completed 2011
White rooftops	Safety and Facilities Services	installed white rooftops on certain existing buildings to reduce urban heat island effect (CHRP)	Completed 2011
Boiler replacement	Safety and Facilities Services	Boiler replacement at Seniors Centres	Completed 2012
Solar panel installation	Safety and Facilities Services Community and Operations Services	Delpark Homes Centre, Donevan, GM Centre and Civic Complex (Opanels owned by the OPUS) - roof space is rented from the City	Completed 2013
Lighting upgrades	Safety and Facilities Services	Lights upgraded in buildings City-wide	Completed 2013
Rink upgrades	Safety and Facilities Services Community and Operations Services	Upgraded and replaced rink equipment, controls and condenser units at Harman Park Arena	Completed 2013
Convert oil furnaces to gas	Safety and Facilities Services	Converted furnaces at Bathe Park and Sunnyside Community Centres	Completed 2014

Item	Lead Department	Description	Status
Ultra-violet (UV) systems	Safety and Facilities Services Community and Operations Services	Installed of UV systems for pools at Donevan, Delpark Homes Centre, Civic and South Oshawa	Completed 2015
Lighting upgrades	Community and Operations Services	Lights upgraded at Alexandra Park Tennis Court	Completed 2015
Combined Heat and Power (CHP)	Safety and Facilities Services Community and Operations Services	Install CHP project at Delpark Homes Centre Centre	Completed 2022
LED conversion	Community and Operations Services	Convert all older street lighting to LEDs - Continue to investigate converting all of City street lights to LED	Completed in 2017 (CS-17-48)
LED conversion and controls	Safety and Facilities Services	Investigate converting lights in the parking garages to LEDs and add motion and photocell sensors to lights	Completed in 2017
Boiler upgrades	Safety and Facilities Services Community and Operations Services	Investigate and install instant hot water heaters at Northview Community Centre and Civic Complex	Completed 2018
LED conversion	Safety and Facilities Services	Gradually replace LED lighting at Delpark Homes Centre parking lot	Completed 2017
LED conversion	Safety and Facilities Services	Convert old existing exit signs to the new LED signs	Mary Street completed 2016, McMillan Garage completed 2017
Pool waste heat recovery system	Safety and Facilities Services Community and Operations Services	Install waste heat recovery system controls to pre-heat the pool water	Completed 2018

B. Technical Measures

Item	Lead Department	Description	Status
Install occupancy sensors in City Hall parking garage	Safety and Facilities Services	Ensured that light levels are adequate for safety and security	Completed 2013 to 2014
Printer and photocopier conversion	Safety and Facilities Services	Replaced printers and photocopiers with "smarter" more efficient models. Reduced paper consumption by more than 50%	Completed 2015
Upgrade computers	Corporate and Finance Services	Replaced existing stock with models that are 50% more efficient	Completed January 2014 to December 2015

C. Organizational Objectives and Measures

Item	Lead Department	Description	Status
Switch to recycled paper	Corporate and Finance Services (Purchasing)	Reduced energy impact of processing and printing new paper	Completed 2008
Adopt greenhouse gas (GHG) and energy emission targets	Economic and Development Services	Completed the Milestone 2 of Partners for Climate Protection program	Completed 2010
Energy savings reinvestment fund	Corporate and Finance Services	Explore development of a savings reinvestment mechanism whereby savings (at least 50%) from energy efficiency projects can be re-invested into proposed energy efficiency improvements. Explore the possibility of creating a fund from: documented energy savings, incentive payments received for completed projects and energy commodity purchase price savings	Completed 2018 (FIN-18-28)
Business travel policy	Corporate and Finance Services (Human Resources)	Promote more efficient travel modes for travel outside city (no-cost, quick win)	Completed 2018
Telecommuting policy	Corporate and Finance Services (Human Resources)	Explore a policy for staff for local travel and telecommuting.	Remote Work Policy Implemented 2022

D. Behavioural Measures - Implementation of Energy Conservation and Efficiency Awareness

Item	Lead Department	Description	Status
Staff review of Corporate Facilities Energy Management Plan	Safety and Facilities Services	Provide an opportunity for staff to: understand the goals and objectives of this plan and the need for this plan, review and obtain buy-in to the plan	Completed 2014
Sustainable Meeting Guidelines	Economic and Development Services	Prepare Sustainable Meeting Guidelines to guide staff in hosting sustainable meetings	Completed 2016

E. Ongoing items delivered through Corporation of City of Oshawa Departments

Item	Lead Department	Description	Status
Tree Canopy	Community and Operations Services	Inventory and increase tree canopy	Ongoing
Review green purchasing policies	Corporate and Finance Services (Purchasing)	Ensure purchasing policies and guidelines incorporate cost-effective energy efficiency requirements.	Ongoing
Business travel - carbon offsetting	Corporate and Finance Services (Human Resources)	When travelling by plane, City purchases carbon offset	To be considered at the next update of Business Travel Policy
Waste Audit of City Facilities	Community and Operations Services	Increase diversion rates from 70% to 90% at City Hall by providing blue boxes, green bins, removing garbage cans - provided staff education throughout the process. Undertake audits at other City facilities.	Ongoing
Budget alignment	Corporate and Finance Services Safety and Facilities Services	Coordinate City Facility Energy Management Plan (C.F.E.M.P.) with City's budgeting planning process	Ongoing

Appendix B – City of Oshawa Asset List

Facility	Asset Category	Year Constructed
Airport - Field Electrical Bldg / Eqpt	Government	1996
Airport - Airport Terminal Building	Government	1997
Airport - Oshawa Aeronautical, Military and Industrial Museum	Government	1940
Airport – Former Robert Stuart Museum	Government	1940
Airport – Former Robert Stuart Museum Storage Building	Government	1940
Hangar 1	Government	1997
Hangar 2	Government	2001
Arts Resource Centre	Government	1952
Bathe Park Community Centre	OCCNA	1941
Centre St. Parking Garage and Bus Terminal (G1)	Parking Facilities	1974
Children's Arena	Arenas	1956
City Hall - B Wing	Government	1967
City Hall - C Wing	Government	2010
City Hall - Parking Garage	Government	1967
City Hall - Rundle Tower	Government	1967
Civic Complex - Admin/Pool/Fieldhouse	Recreation	1967
Civic Complex - Civic Dome	Recreation	1974
Civic Complex - Civic Stadium	Recreation	1971
Civic Fields Change / Rooms	Recreation	1980
Civic Shed 1	Recreation	2011
Civic Shed 2	Recreation	2011
Civic Shed 3	Recreation	2011
Columbus Park Community Centre	Community	1859
Connaught Park Community Centre	OCCNA	1967
Consolidated Operations Depot - Garage	Government	1989
Consolidated Operations Depot - Offices	Government	1989
Consolidated Operations Depot - Salt Shed	Government	2014
Consolidated Operations Depot - Vehicle Cover Storage	Government	2015
Cordova Valley Park Community Centre	Community	1975

Facility	Asset Category	Year Constructed
Donevan Recreation Complex	Recreation	1975
Fernhill - Nipigon Community Centre	OCCNA	1960
Fire Hall 1	Fire Services	1981
Fire Hall 2	Fire Services	1982
Fire Hall 3	Fire Services	1976
Fire Hall 4	Fire Services	1981
Fire Hall 5	Fire Services	2006
Fire Hall 6	Fire Services	2016
Glen Stewart Community Centre	OCCNA	1970
Harman / Cordova Community Centre	OCCNA	1948
Harman Park Arena	Arenas	1970
Howden Rd - Offices and Garage	Government	1991
Howden Rd - Sand Dome	Government	1991
Jubilee Pavilion	Community	1920
Kingside Community Centre	OCCNA	1950
Kinsmen Park - Announcers Booth	Community	1982
Kinsmen Park - Concession Stand	Community	1947
Kinsmen Park - Office-Change Rooms	Community	1947
Lake Vista Change House (Storage)	OCCNA	1973
Lake Vista Community Centre	OCCNA	1973
Lakeview Park - Northside Change/Washrooms	Community	1990
Lakeview Park - Simcoe Street Lifeguard	Community	1982
Lakeview Park - Southside Office/Washrooms	Community	1990
Laval Community Centre	Community	1978
Delpark Homes Centre	Recreation	2005
MacKenzie Park Community Centre	OCCNA	2003
Mary Street Parkade (G3)	Parking Facilities	1992
McMillan Parkade (G2)	Parking Facilities	1982
Memorial Park Bandshell	Community	1942
North Oshawa Community Centre	OCCNA	1965

Facility	Asset Category	Year Constructed
Northview Branch Library	Libraries	1987
Northview Community Centre	Community	1989
Northview Community Centre - Lawn Bowling Building	Community	1989
Oshawa Power - Administration	Partners	1931
Oshawa Power - Distribution and Trades	Partners	1949
Oshawa Power - Garage	Partners	1946
Oshawa Power Meters, Technical Services and Warehouse	Partners	1949
Oshawa Museum - Guy House	Government	1835
Oshawa Museum - Henry House	Government	1849
Oshawa Museum - Robinson House	Government	1846
Oshawa Senior Citizen Centre	Partners	1968
Oshawa Tourist Information Centre	Government	1984
Oshawa Union Cemetery - Columbarium (Double)	Government	2005
Oshawa Union Cemetery - Columbarium (Single)	Government	2005
Oshawa Union Cemetery - Garage	Government	1970
Oshawa Union Cemetery - Mausoleum	Government	1924
Oshawa Union Cemetery - Offices	Government	1920
Oshawa Union Cemetery - Storage Building	Government	1960
Parks and Animal Services Centre - Greenhouse	Government	1961
Parks and Animal Services Centre - Hoop House	Government	1995
Parks and Animal Services Centre - Main Building	Government	1961
Parks and Animal Services Centre - Potting / Boiler Room	Government	1961
Parks and Animal Services Centre - Storage Building #1 (East)	Government	1961
Parks and Animal Services Centre - Storage Building #2 (Southwest)	Government	1970
Parks and Animal Services Centre - Storage Building #3 (Northwest)	Government	1980
Parks and Animal Services Centre - Storage Building #4 (IPM)	Government	2006
Parks and Animal Services Centre - Storage Shed	Government	1970
Pump House	Government	2010
Radio Park - Restrooms	Community	2002
Radio Park - Storage	Community	2006

Facility	Asset Category	Year Constructed
Radio Park - Storage and Canopy	Community	2002
Robert McLaughlin Gallery	Government	1967
Robert McLaughlin Library	Libraries	1953
Rotary Hall	Community	1950
Rundle Community Centre	OCCNA	1986
South Oshawa Community Centre	Recreation	2005
Southmead Community Centre	OCCNA	1968
Storie Community Centre	OCCNA	1948
Sunnyside Park Community Centre	OCCNA	1968
Thornton / Dundee Community Centre	OCCNA	1880
Tribute Community Centre	Partners	2006
Valleyview Community Centre	OCCNA	1970
Woodview Community Centre	OCCNA	1958

¹ Blue highlight indicates the energy use is included in the Prescribed Operations under Broader Public Sector Reporting

References

- ¹ Environment Canada. Greenhouse Gas Division. (2021). Greenhouse gas sources and sinks in Canada. *Environment and Climate Change Canada - National Inventory Report*, (1910-7064). <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/provincial-territorial-energy-profiles/provincial-territorial-energy-profiles-ontario.html>
- ² Independent Electricity System Operator (2022). Pathways to Decarbonization.
- ³ Environment and Climate Change Canada (2022). *2030 Emissions Reduction Plan*. <https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/erp/Canada-2030-Emissions-Reduction-Plan-eng.pdf>
- ⁴ Independent Electricity System Operator (2021, December 2). *The Future of Electricity Demand in Ontario*. Grid Evolution. Retrieved February 16, 2023, from www.ieso.ca/en/Powering-Tomorrow/2021/The-Future-of-Electricity-Demand-in-Ontario
- ⁵ Durham Region (2018). *Durham Community Energy Plan - Part 1*. Durham Low Carbon Pathway. www.durham.ca/en/living-here/resources/Durham-Community-Energy-Plan/Durham-Community-Energy-Plan-Part-1.pdf
- ⁶ Sievers, D. (2019, July 24). *Fuel Switching*. Fresh Energy. <https://fresh-energy.org/fuel-switching-101-moving-towards-an-efficient-and-carbon-free-future>
- ⁷ The Carbon Trust. *Good Practice Guide 84 Managing and Motivating Staff to Save Energy*. <http://www.thecarbontrust.co.uk>.
- ⁸ Energy Star (2019). *Guidelines for Energy Management*. Natural Resources Canada. https://natural-resources.canada.ca/sites/nrcan/files/energy/pdf/EM%20Guidelines%20Eng%20Mar_27_2019.pdf
- ⁹ Federation of Canadian Municipalities (2021). *Partners for Climate Protection*. The PCP Milestone Framework. Retrieved April 6, 2023, from <https://www.pcp-ppc.ca/program>
- ¹⁰ City of Thunder Bay (2019). The Strategic Approach to Corporate Energy Management. 14.
- ¹¹ Independent Electricity Service Operator (2023). *Global Adjustment*. Power Data Price Overview. Retrieved April 24, 2023, from <https://www.ieso.ca/en/Power-Data/Price-Overview/Global-Adjustment>
- ¹² Government of Canada (2018). Greenhouse Gas Pollution Pricing Act. S.C. 2018, c. 12, s. 186, (2018-06-21). <https://laws-lois.justice.gc.ca/eng/acts/G-11.55/page1.html>
- ¹³ UReach Toronto (2023). *Area Municipalities in Durham Region*. Durham Region. <https://www.ureachtoronto.ca/durham-region/>

- ¹⁴ Martin, A. (2019). *Corporate Energy Management Plan* (p. 35). Corporate Energy Team
- ¹⁵ American Society of Heating, Refrigerating and Air-Conditioning Engineers (2018). *ANSI/ASHRAE/ACCAS standard 180-2018 Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems*
- ¹⁶ Natural Resources Canada (2023, April 27). *ISO 50001 Energy Management Systems Standard*. Energy Management for Industry. <https://natural-resources.canada.ca/energy-efficiency/energy-efficiency-for-industry/energy-management-industry/iso-50001-energy-management-systems-standard/20405>
- ¹⁷ American Society of Heating, Refrigerating and Air-Conditioning Engineers (2011). *Procedures for Commercial Building Energy Audits* (2nd ed.)
- ¹⁸ Efficiency Valuation Organization (2023.). *International Performance Measurement and Verification Protocol (IPMVP)*. EVO-World. <https://evo-world.org/en>
- ¹⁹ Martin, A. (2019). *Corporate Energy Management Plan* (p. 20). Corporate Energy Team
- ²⁰ Environment and Climate Change Canada (2022). *2030 Emissions Reduction Plan*. <https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/erp/Canada-2030-Emissions-Reduction-Plan-eng.pdf>
- ²¹ Association of Municipalities of Ontario (2023). *Canada Community-Building Fund*. www.buildingcommunities.ca
- ²² Environment and Climate Change Canada (2022). *2030 Emissions Reduction Plan*. <https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/erp/Canada-2030-Emissions-Reduction-Plan-eng.pdf>
- ²³ Town of Whitby (2023). Data sharing conducted for review of municipal EV charging uptake.