

- 1 Introduction ..... 5
  - 1.1 Climate Change 101 and Local Impacts ..... 5
  - 1.2 The Context Regarding Net-Zero ..... 5
    - 1.2.1 Pivoting towards Net-Zero Future ..... 5
      - Climate imperative to achieve net-zero..... 6
      - Managing risk and preparing for opportunities..... 6
  - 1.3 Two generations of Climate Action at the City of Kitchener ..... 7
    - 1.3.1 First Generation ..... 7
    - 1.3.2 Second Generation..... 7
    - 1.3.3 CorCAP 2.0 Framework ..... 8
    - 1.3.4 Influence and Impact ..... 8
  - 1.4 Corporate GHG Inventory ..... 9
    - 1.4.1 Variations in GHG Intensity..... 10
  - 1.5 Strategic Priorities by Focus Area ..... 11
    - 1.5.1 Facilities..... 11
    - 1.5.2 Fleet & Equipment ..... 13
    - 1.5.3 Streetlighting..... 14
    - 1.5.4 Staff Travel ..... 14
    - 1.5.5 Corporate Waste ..... 15
  - 1.6 Historical Trends 2016 – 2023 ..... 15
    - 1.6.1 Noteworthy Trends in the data..... 16
      - Sustained GHG reduction in Streetlighting ..... 16
      - Service growth and GHGs ..... 16
      - COVID-19 Pandemic impacts on GHGs ..... 16
      - Electricity Grid..... 16
      - Heating Degree Days..... 17
      - Corporate and Community Emissions..... 17
- 2 The Plan – Pivot: Net-Zero ..... 18
  - 2.1 Corporate priority pathways..... 18
  - 2.2 Facilities Focus Area ..... 18
    - 2.2.1 Defining a Net-Zero building ..... 18
    - 2.2.2 Facilities Energy Management Program ..... 19
      - Energy Management Practices ..... 19

Energy Management Policy .....	19
Energy Management Monitoring System .....	19
Facilities Energy Management Technical Advisory Committee .....	19
2.2.3 Corporate Green Building Standard .....	19
2.2.4 GHG Reduction Pathway Development .....	20
2.2.5 Arenas Strategy .....	20
2.2.6 Pool Strategy .....	20
2.2.7 Facility Acquisition & Decommissioning Policy .....	20
2.2.8 Solar Strategy .....	21
2.2.9 HVAC fuel switching modelling .....	21
2.2.10 Ice Resurfacing Pilot .....	21
2.2.11 HVAC Fuel Switching .....	21
2.3 Fleet and Equipment .....	22
2.3.1 Fleet Asset Management Plan .....	22
2.3.2 Fleet Efficiency .....	22
Fleet Telematics .....	22
Fleet Users Working Group .....	22
Corporate Fuel Efficiency Policy .....	22
Fleet Driver Training & Corrective Procedures .....	23
Right-sizing .....	23
Efficient Route Planning .....	23
Fleet Equipment Review Process .....	23
2.3.3 Fuel Switching .....	23
Electrifying vehicles and equipment .....	23
EV Charging Infrastructure .....	24
EV Charging Station Asset Management Plan .....	24
Zero Emissions Vehicle (ZEV) Transition Strategy / Sustainable Fleet Strategy .....	24
Alternative Fuels .....	25
Lower Carbon Fuels .....	25
Biodiesel 5, Biodiesel 20, and Ethanol Blend 10% .....	25
Renewable Diesel .....	25
Propane .....	25
Compressed Natural Gas .....	25

Zero Tailpipe Emission Fuels .....	25
Hydrogen.....	25
2.3.4 Fleet Integrated Renewable Energy & Storage Systems.....	26
2.4 Streetlights .....	26
2.5 Staff Travel .....	26
2.6 Corporate Waste .....	26
2.7 Implementation .....	27
2.7.1 Capacity Building, Readiness and Timing.....	27
Corporate Climate Change Literacy Modules .....	27
2.7.2 Partners and Engagement.....	27
Project Teams and Staff .....	27
Kitchener Climate Change and Environment Advisory Committee .....	27
Community.....	27
Data holders.....	28
Enova.....	28
SWR.....	28
Research and Innovation Partners.....	28
2.7.3 Funding Net-Zero .....	28
Expanding existing Funding Sources within our control.....	28
Energy Management Reserve Fund .....	28
Fleet Replacement Reserve Fund .....	29
Grants.....	30
Advocacy .....	30
2.7.4 Future Considerations.....	30
Refrigerant Fugitive Emissions.....	30
Embodied Carbon .....	30
Offset Policy .....	30
2.7.5 Informed and Integrated Decision Making .....	31
Policy Alignment .....	31
Strategic Planning, Business Plans and Budgets .....	31
2.7.6 Accountability and Reporting .....	31
External Reporting Frameworks .....	31
Legislated .....	31

Voluntary.....	31
Internal Reporting Frameworks .....	31
Carbon Budgets.....	31
Reporting on Progress towards Net-Zero .....	31
Corporate .....	32
Focus Areas .....	32
Fleet .....	32
Facilities.....	32
Project Level Indicators.....	33
Reserve Fund Indicators.....	33
2.8 Conclusion.....	33
3 APPENDIX A – Corporate GHG Inventory, Baseline Adjustments & Methodology.....	34
3.1 Methodology.....	34
3.2 Assets in the GHG Inventory .....	34
3.2.1 2016 Baseline Adjustment .....	35
3.2.2 Facilities Inclusion Criteria .....	35
4 Appendix B – Summary of CorCAP 2.0: <i>Pivot Net-Zero</i> Actions by Division .....	37
5 Appendix C – Annual Progress Reporting .....	38

## 1 Introduction

### 1.1 Climate Change 101 and Local Impacts

Climate change is a global problem being experienced and addressed at the local level in municipalities across the globe. At its core (and the focus of this report), climate change is a result of decades of burning of fossil fuels for energy. When fossil fuels are burned, they release greenhouse gases (GHGs) into the atmosphere – including carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>). This addition of GHGs to our atmosphere keeps radiant heat in, warming the planet through the intensification of the natural greenhouse effect that otherwise helps to regulate earth’s surface temperatures.

Over time, this has resulted in an increase in average global surface temperatures. Recent data shows 2023 as the hottest year on record, with average temperatures nearly 1.5°C higher than pre-industrial (1850-1900) levels. It is anticipated that, at 2°C higher than pre-industrial temperatures, communities across the globe will experience the worst impacts of climate change. At home in Canada, temperatures are rising twice as fast as the global average – and three times as fast in Canadian Arctic communities. Specifically in our region, local climate modelling completed in 2022 predicts warmer, wetter, and wilder weather with more extreme heat and extended heat waves, warmer overnight temperatures and fewer days that fall below -15°C. We have already witnessed the effects of a warming climate by an increase in both frequency and severity of extreme weather events that can damage infrastructure and disrupt services. These events include ice storms, heavy rainfall, severe thunderstorms, prolonged heat waves and droughts. Further to this, these effects disproportionately affect vulnerable communities, exacerbating inequalities and undermining efforts to achieve sustainable development. Mitigation efforts aim to reduce GHG emissions, limit temperature rise, and minimize the severity of climate impacts, thereby safeguarding ecosystems, protecting livelihoods, and ensuring a more resilient and equitable future for all. Given the urgency and scale of the challenge, concerted action at the individual, community, corporate, and governmental levels is essential to mitigate climate change and preserve a habitable planet for current and future generations.

What we have come to know as “business as usual” regarding energy consumption is anticipated to lead towards a 5°C increase in global average temperatures. This underscores the urgency of climate action work and the need for deep, rapid, and sustained GHG emission reductions, achieved by an energy transition off fossil fuels.

### 1.2 The Context Regarding Net-Zero

#### 1.2.1 Pivoting towards Net-Zero Future

The City is preparing for a net-zero emissions energy future. Achieving net-zero emissions means cutting greenhouse gas emissions from human activities to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere.

Because most emissions are caused by burning fossil fuels for energy, achieving net-zero emissions is mostly about achieving a clean energy transition, moving our energy use step-by-step off fossil fuels and to other non-emitting forms of energy. Net-zero is a meaningfully different target than common previous commitments, which often had a final goal of producing fewer emissions than are currently being produced in a final target year, using a percentage-based reduction. However, when these kinds of targets are achieved, significant emissions will continue to be produced every year after the target is reached. When additional GHGs are released into the atmosphere, mostly through energy use, those

emissions and their impact remain in the atmosphere for decades, or even centuries. Adding emissions to the atmosphere is like adding water to a bathtub; as long as you are adding more water to the tub than is draining from it, the water in the tub will rise and eventually overflow.

Achieving net-zero and getting emissions as close to zero as possible will mean transitioning the City away from fossil fuel use for energy. This means making systemic changes to our activities and assets, and treating interim emissions reduction targets as a guideline to indicate whether we are on track to achieve the speed and scale of change that is needed to avert the worst impacts of climate change and reach net-zero by 2050.

### Climate imperative to achieve net-zero

There are two main reasons for the City to prepare for a net-zero energy future, by undertaking our own transition away from fossil fuels. First the guidance of organizations like the Intergovernmental Panel on Climate Change (IPCC), acknowledges the imperative to achieve net-zero emissions globally by mid-century to avoid the worst impacts of climate change.

The City is far from alone in acknowledging that imperative. There is broad global agreement on the need to achieve net-zero emissions, where we no longer add more GHGs to the atmosphere from human activities, by mid-century. Canada has joined countries around the world that have committed to achieving net-zero carbon emissions by 2050, and to reduce emissions to 40-45% below 2005 levels by 2030. More recently, in December 2023, the COP28 negotiations representing nearly 200 countries, resulted in a consensus statement committing to contribute to global efforts for “transitioning away from fossil fuels in energy systems, accelerating action in this critical decade, so as to achieve net zero by 2050.

Climate change is a global problem with local causes and local solutions. Given these efforts across the world, The City of Kitchener has a responsibility as an organization to do our part by addressing our corporate GHGs - the GHGs that are emitted by way of our service delivery to the community.

### Managing risk and preparing for opportunities

The second reason to undertake the City’s energy transition to prepare for a net-zero future is to manage risk and prepare for future opportunities. Energy systems are changing around us, and lower carbon technologies are changing the way we get and use energy. In this context, there are policy and regulatory risks to the City that arise from continuing business as usual, as energy systems change around us. Currently, as is the case in many countries, pollution pricing is in effect across Canada, which highlights the financial risk of inaction regarding an energy transition. The City spent approximately \$654,000 on the federal pollution pricing benchmark in 2023 through its fuel and electricity bills, and this number is currently scheduled to rise over time. These costs are in addition to the volatility associated with fossil fuel prices, which can unexpectedly put pressure on budgets for municipalities.

There is also a social cost to inaction in the energy transition. For every tonne of GHG emitted from our operations, there is additional damage to society felt through the impacts of climate change. According to Environment and Climate Change Canada’s estimate for the social cost of carbon, Kitchener’s GHG emissions for 2023 can be equated to approximately \$2.8 million in societal damages. Conversely, as GHG emissions are reduced (or otherwise removed from the atmosphere), it will be possible to quantify the benefit this has to society.

While specific policy mechanisms may change over time, climate- and emissions-related policies are likely to be a continuing and growing feature of the policy and regulatory landscape in the coming decades. Advancing the City’s corporate energy transition best prepares the City to withstand and prosper under various climate and energy policy initiatives.

Preparing to achieve net-zero will also put the City in the best position to take advantage of clean energy opportunities in the coming decades as the policy and industry environment evolves. Governments at various levels are increasingly investing in and funding the energy transition. Provincial policies and investments enabling the development of clean tech industries, such as EV battery manufacturing, have been increasing as well. Funding opportunities can be linked to specific GHG performance, and it is reasonable to expect that these requirements could become more common for various types of funding. Aligning City capital investments and operating practices to achieve net-zero will put the City in a strong position to remain competitive in the evolving funding and investment landscape.

### 1.3 Two generations of Climate Action at the City of Kitchener

#### 1.3.1 First Generation

The City of Kitchener has long been committed to taking action against climate change, exemplified by our membership in the Federation of Canadian Municipalities – Partners for Climate Protection (FCM PCP) dating back to its inception in the early 1990s. The PCP program is funded by ICLEI—Local Governments for Sustainability (ICLEI Canada) and the Federation of Canadian Municipalities’ Green Municipal Fund. Kitchener voluntarily reported actions that reduced our corporate GHG emissions starting around 2008.

In 2018, the City established the Sustainability Office, solidifying its commitment to climate action in our corporate structure. In 2019 the office published the inaugural Kitchener Corporate Climate Action Plan (CorCAP 1.0 - DSD-19-094), and reported on its [progress](#).

CorCAP 1.0 set a Corporate GHG reduction target of 8% by 2026 from a 2016 baseline year. The year following its publication, on March 11<sup>th</sup>, 2020, the World Health Organization declared COVID-19 a Global Pandemic. This declaration brought a swift and significant drop in corporate GHG emissions because of lockdowns that shut down City facilities and enacted work from home orders. What this meant is that in 2020 the City of Kitchener exceeded this 8% GHG reduction target. However, in the years since, corporate GHG emissions have rebounded.

The first generation CorCAP was closed out March 7, 2022 (DSD 2022-072) and the City of Kitchener achieved FCM PCP Milestones 1-5.

#### 1.3.2 Second Generation

This second-generation corporate climate action plan sets out to achieve the same 8% target endorsed in CorCAP 1.0, along with making a much deeper commitment to being net-zero by 2050. The magnitude in shift from an 8% reduction target to net-zero target is significant. Realizing sustained GHG reductions and indeed a net-zero future does not rest on a suite of individual, one-off projects. Kitchener will need to make significant capital investments, strategic, systemic, and deeply integrated changes to corporate processes, business planning and policies along with the willingness to adopt and integrate promising solutions as they become available. This second-generation plan seeks to orient the organization in making sustained GHG reductions and in the direction of progress on this net-zero goal.

### 1.3.3 CorCAP 2.0 Framework

This report is Part 1 of 3 related bodies of work. Parts 1 and 2 focus on climate change mitigation, with Part 1 focusing on driving down our corporate GHG emissions. Part 2 will focus on decarbonizing our communities energy supply ([Kitchener Utilities Clean Energy Strategy](#)) and reducing our overall community energy demand ([Transform WR](#)). Part 3 will shift focus to climate change adaptation through the City of Kitchener Corporate Climate Adaptation Plan, complemented by the [Region of Waterloo Community Climate Adaptation Plan](#).

### 1.3.4 Influence and Impact

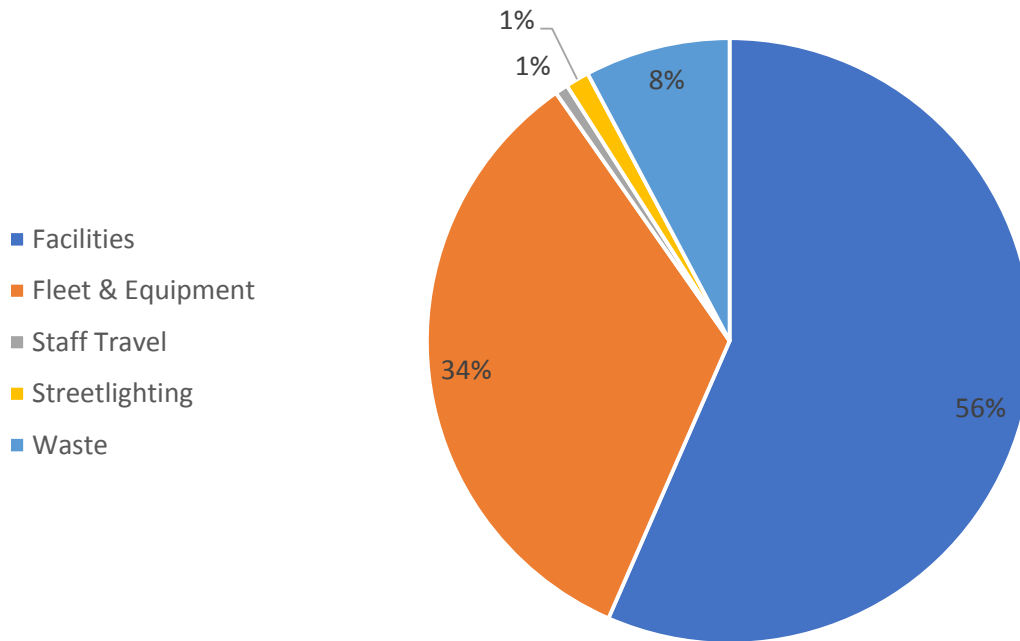
The City of Kitchener corporate GHG emissions represent less than 1% of our total region-wide community emissions. Nonetheless this 1% of emissions is accepted as our corporate responsibility. Municipalities additionally have influence on over 50% of community GHG emissions and this focus is the work of Phase 2 of this plan which includes Kitchener Utilities' Clean Energy Transition Strategy and TransformWR our community climate action plan.

Strategically focusing effort in areas within our control is the focus of this plan. GHG emissions are commonly classified into three scopes and as under our direct or indirect control. Scope 1 emissions are under our direct control (e.g., corporate fleet and equipment and natural gas combustion in our facilities); whereas scope 2 and 3 are indirect emissions. Indirect emissions are not in our direct control (e.g., emissions from the electricity that is generated offsite that we consume at our facilities).



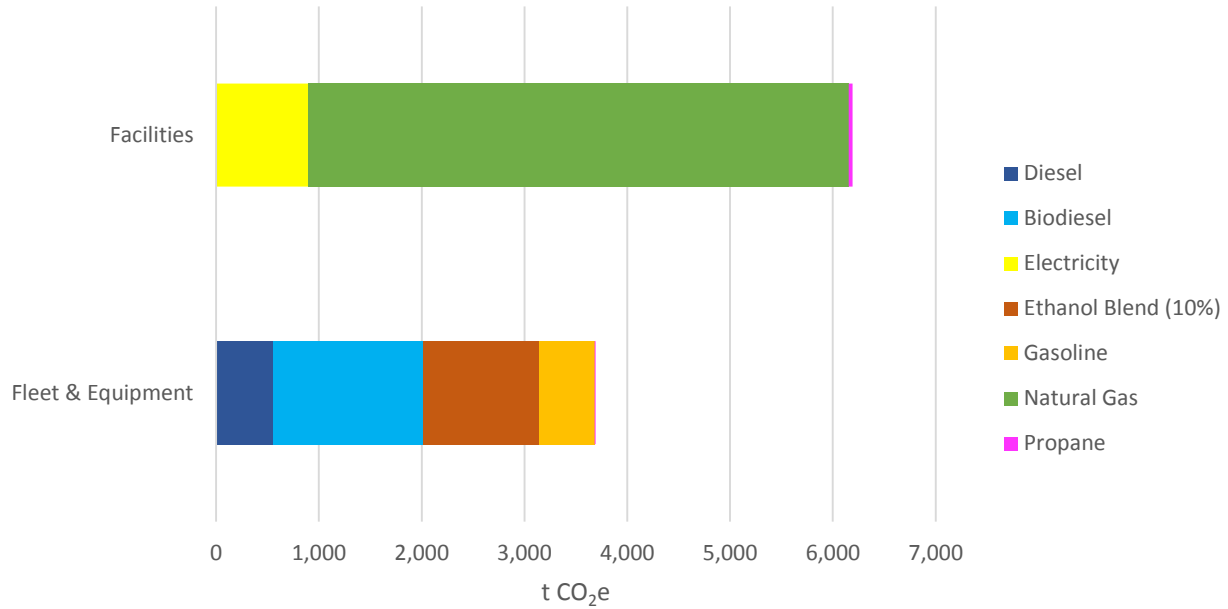
### 1.4 Corporate GHG Inventory

The City of Kitchener reports on GHG emissions in five corporate focus areas, presented below in Figure 1. These corporate focus areas are consistent across most if not all municipalities. GHG emissions are calculated based on energy consumption (fuel, electricity, natural gas) and emissions factors from verified sources (these details are further described in Appendix A).



**Figure 1 – 2023 Corporate GHG Emissions by Focus Area**

In 2023, the City of Kitchener emitted 10,947 tonnes of GHGs (CO<sub>2</sub>e). Ninety percent of these emissions came from two corporate focus areas – Facilities (56%) and Fleet & Equipment (34%), which is a typical distribution when looking back over the last several years. When we look at our corporate sources of energy within these two focus areas (Figure 2) particularly the types of fossil fuels we rely on, we see natural gas playing an important role in our facilities (for space heating and domestic hot water). Space heating alone accounts for approximately 80% of facilities natural gas use. While in our fleet & equipment – gasoline and diesel are significant. Gasoline is used primarily for lighter duty vehicles and diesel in medium and heavy-duty vehicles.



**Figure 2 - 2023 Facilities and Fleet & Equipment GHG Emissions by Energy Type**

As GHG emissions on their own can be difficult to relate to, utility costs offer an alternative way to look at energy consumption across the City. Table 1 below outlines costs by energy source for both Facilities and Fleet & Equipment focus areas. We can expect to see a shift in the distribution of these costs as the transition away from fossil fuels unfolds, and with the introduction of renewable energy sources. These savings could be used towards various financing mechanisms to support meeting the costs of this transition.

**Table 1 - 2023 Utility and Fuel Costs**

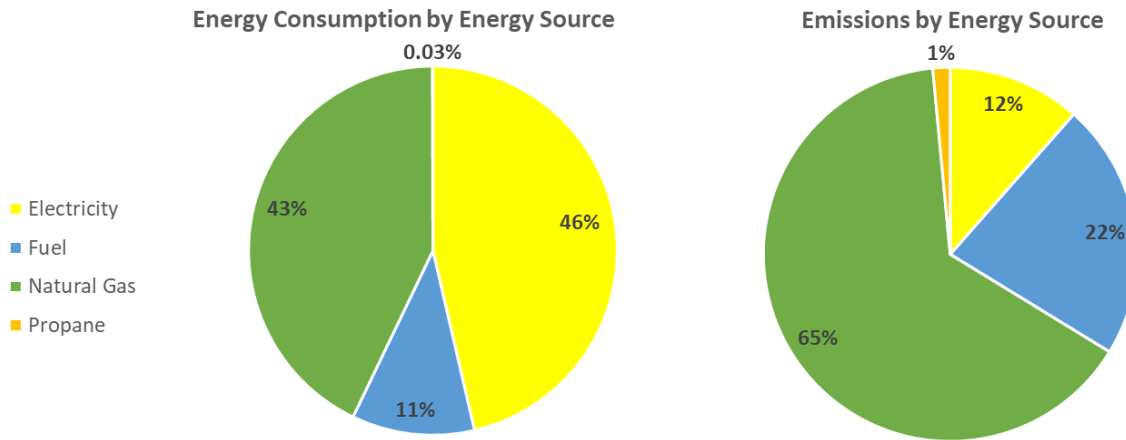
Energy Source	2023 Cost
Gasoline (includes gasoline and ethanol blend)	\$956,502
Diesel (includes petroleum diesel and biodiesel blends)	\$1,086,535
Propane – fleet & equipment	\$5,137
<i>Fleet Total</i>	<i>\$2,048,174</i>
Propane - facilities	\$14,808
Electricity	\$4,481,485
Natural Gas	\$1,115,797
<i>Facilities Total</i>	<i>\$5,612,090</i>
<b><i>Grand Total</i></b>	<b><i>\$7,660,264</i></b>

#### 1.4.1 Variations in GHG Intensity

When it comes to GHG emissions, not all energy sources are equal. This becomes clear when comparing energy consumption to GHG emissions for different energy sources (Figure 3). The variation in GHG intensities between different energy sources becomes clear. For instance, electricity is the source for 46% of our corporate energy in 2023, yet only accounts for 12% of our corporate GHGs. Natural gas by comparison is the source of 43% of our energy used – yet accounts for 65% of our corporate GHGs.

Similarly, fleet fuels account for 11% of total corporate energy used, but 22% of corporate GHGs emissions.

This data provides insight into how transitioning to lower carbon energy sources is important, why it is sound for this to be a corporate priority and how a corporate energy transition can make a significant impact on our corporate GHGs and in our corporate journey to net-zero.



**Figure 3 - 2023 Energy Consumption vs Emissions by Energy Source**

## 1.5 Strategic Priorities by Focus Area

### 1.5.1 Facilities

Facilities are responsible for more than half of Kitchener’s corporate GHG emissions (56%). Eighty-five percent of these GHG emissions are due to natural gas consumption used for space and water heating - equivalent to 48% of total corporate emissions. Looking at the data with both a facility and energy type lens, enables a more granular and strategic understanding of Facilities and their contribution to corporate GHGs. Certain facility types emerge as priority areas for making impact including Arenas, Administrative Buildings and Pools (Figure 4). This is underscored by looking at the corporate Top 10 GHG emitting facilities (Figure 5), 8 of which fall into these 3 categories, including 6 within the Sport Division (Arenas and Pools).

CorCAP 2.0 – Pivot: Net-Zero (2023-2027)

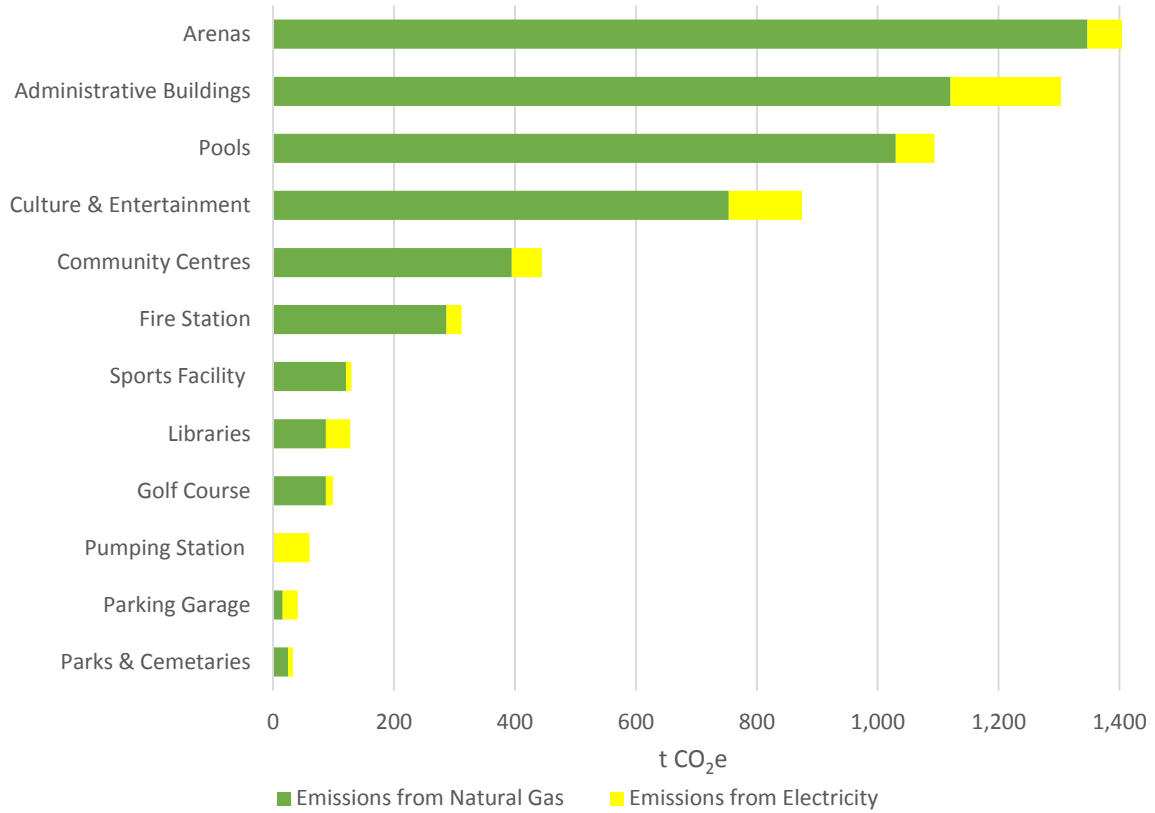
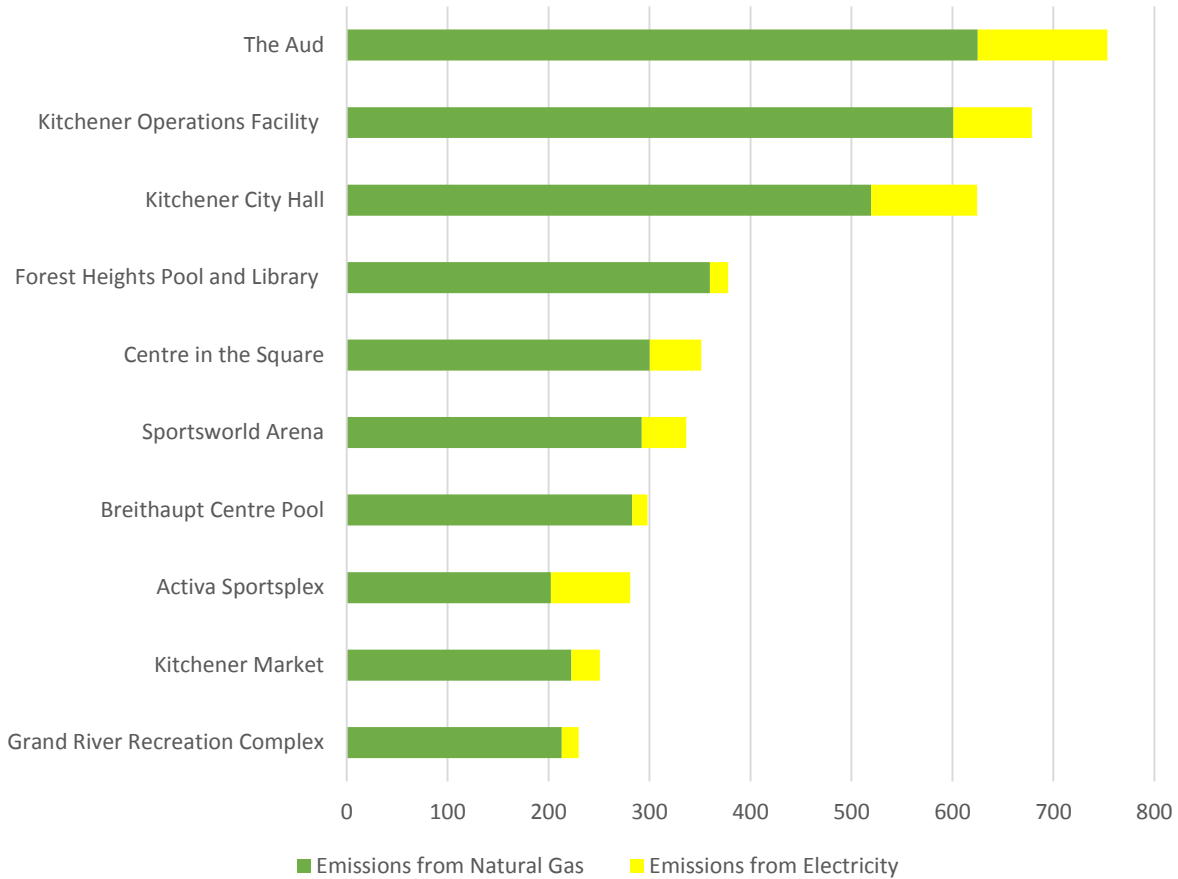


Figure 4 – 2023 Corporate GHG Emissions by Energy Source and Facility Type



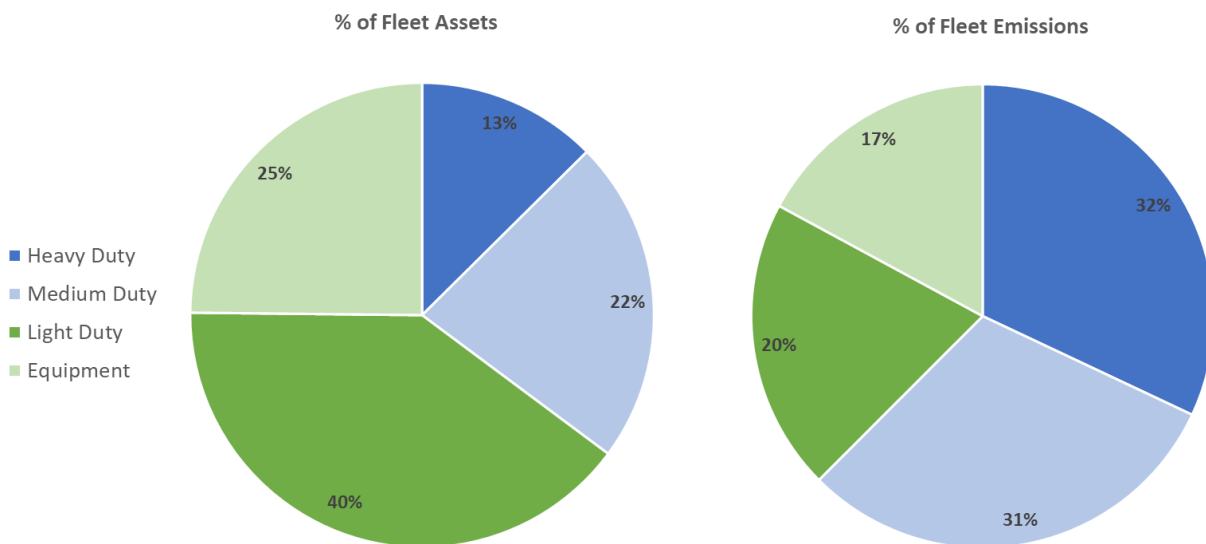
**Figure 5 - 2023 Top 10 GHG Emitting Facilities**

### 1.5.2 Fleet & Equipment

The Fleet Division at the City of Kitchener is an integral part to service delivery across many departments. In total, Fleet is responsible for nearly 600 on and off-road vehicles and equipment, and approximately 500 small handheld pieces of equipment.

With strong and consistent support across the entire organization to “electrify when and where possible,” fleet has added 14 battery electric vehicles (BEVs) to their fleet of light duty vehicles (LDVs). LDVs include cars, cargo vans, SUVs and smaller pick-up trucks and they make up 40% of our fleet assets but are only responsible for 20% of fleet emissions (Figure 6). The marketplace currently offers electric options for many LDVs. This vehicle type is most ready to transition to zero-emission options.

By contrast, the medium and heavy-duty vehicle marketplace is limited in its offering of zero emissions vehicle options. Vehicles in this category include dump trucks, large pick-up trucks (e.g., Ford 550) and fire trucks. These two categories represent 35% of our total fleet assets and 63% of our fleet and equipment emissions (Figure 6). Therefore, even by electrifying all of our light-duty vehicles, the majority of emissions from this focus area will persist until viable options present in the marketplace. Making significant and sustained corporate fleet GHG reductions will continue to be a challenge not readily remedied within the next 5 years.



**Figure 6 – GHG Emissions by Fleet Vehicle Class, not including Small Equipment**

### 1.5.3 Streetlighting

The City of Kitchener is responsible for a network of approximately 18,325 Cobra Head streetlights and 2,689 decorative post-top lights. Acknowledging the opportunity to reduce GHG emissions from electricity to power lights and for impressive cost savings, in 2017 the City undertook an extensive LED conversion project, converting 15,636 of its Cobra Head streetlights. Cost and energy savings were immediate and significant. In April 2017 (pre-conversion), electricity use for streetlights was approximately 802,000 kWh, and the following April consumption fell to approximately 350,000 kWh. More recently in 2022/2023, a similar project was done for all the City’s decorative post-top lights, with an estimated pay-back period of 10.7 years.

In addition to converting lighting to LED, both projects included the expansion of the City’s adaptive smart network which allows lights to be controlled (e.g., dimmed) and monitored from a remote and central location. The City’s development manual has been updated to require all new subdivisions to include LED lighting fixtures that are equipped with smart nodes for compatibility with the adaptive smart network. Streetlighting is a successful example of achieving significant and sustained GHG emissions.

### 1.5.4 Staff Travel

Staff travel includes travel for work purposes and does not include how staff commute to/from work. In most GHG reporting frameworks, reporting on staff travel is voluntary and for Kitchener it is a new focus area added to our inventory with CLT support on November 1, 2022. Moving forward, this focus area will be included in our reporting of performance measurement from 2021 and subsequent years of reporting. In this case, staff travel includes vehicle mileage claimed by employees who used a personal vehicle for work purposes only. The main purpose in including it as a focus area, is to provide a more holistic view of staff travel related to service delivery to the community to complement fleet reporting and capture GHGs from service delivery by staff who do not use fleet vehicles.

### 1.5.5 Corporate Waste

This focus area includes waste generated at City facilities and from street level and park waste receptacles. While waste may appear to be a small part of corporate emissions (6.5%), methane from waste is much more harmful and potent than other GHGs. From 2016 – 2023, GHG emissions from corporate waste have increased by 26%.

### 1.6 Historical Trends 2016 – 2023

Target setting is a common exercise amongst organizations, ushering in the magnitude and direction of an intended change. In doing so, progress can be tracked against a set baseline year. Figure 7 illustrates this progress. The red dotted line indicates the target for 2026 – which is an 8% reduction from 2016. Comparing 2016 to 2023, we have seen an overall 5% reduction in GHG emissions. While this is a promising trend, it is unknown whether this will be sustained in the coming years, or if it is a matter of both internal and external influences that cause a fluctuation in energy consumption and therefore GHG emissions. Table 2 describes the energy consumption and resultant greenhouse gas emissions over time and shows how corporate GHG reductions overall have not been consistent nor sustained to date. The sections that follow describe important trends seen in our progress during this time period. Appendix A outlines the City of Kitchener corporate GHG inventory, baseline adjustments and calculation methodology.

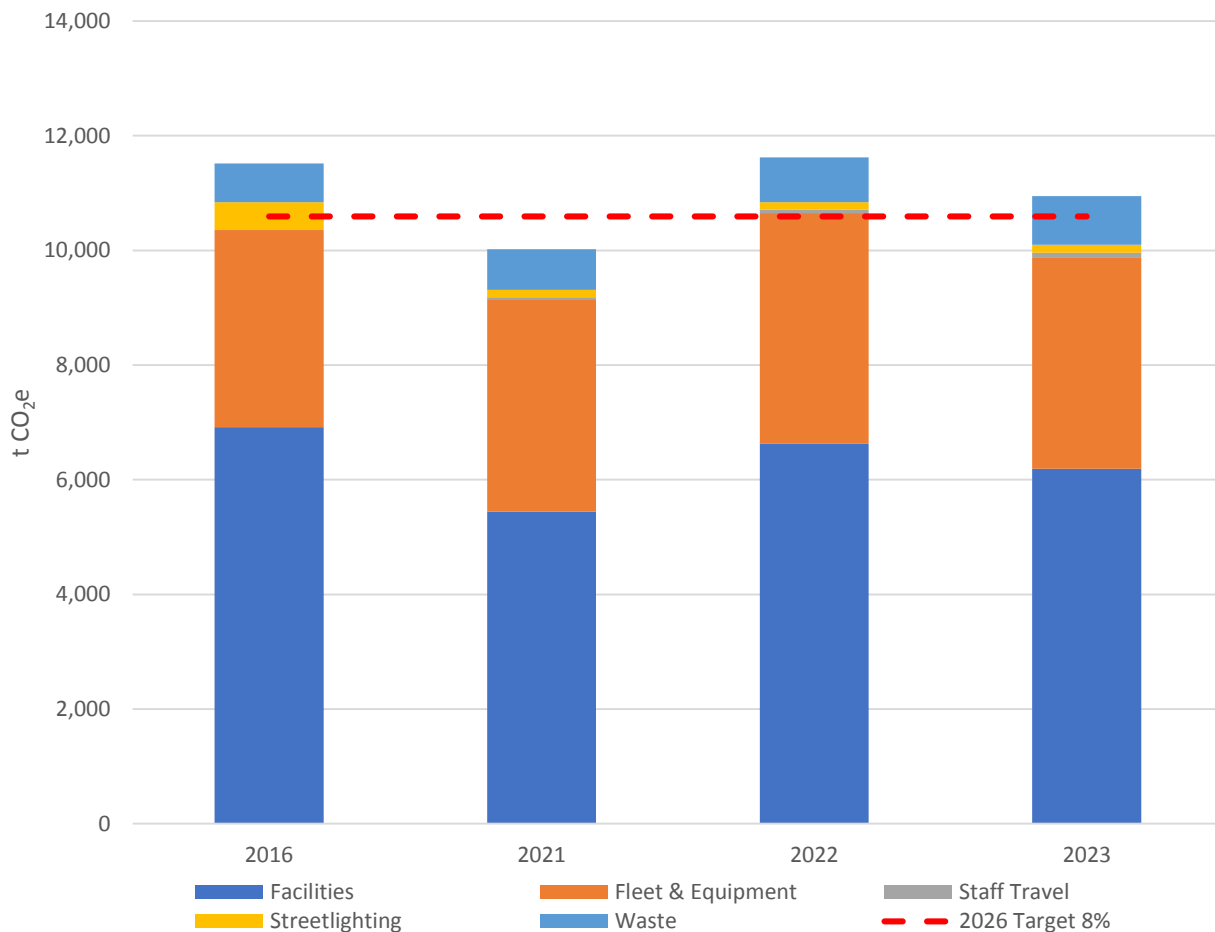


Figure 7 - Corporate GHG Emissions 2016 – 2023

**Table 2 - Corporate GHG Emissions vs Consumption by Focus Area**

	2016-2021		2016-2022		2016-2023	
	% Change in Consumption	% Change in Emissions	% Change in Consumption	% Change in Emissions	% Change in Consumption	% Change in Emissions
Buildings - Electricity	-24%	-48%	-13%	-41%	-10%	-34%
Buildings - Natural Gas	-15%	-15%	+4%	+4%	-5%	-5%
Fleet & Equipment	-1%	+8%	+9%	+17%	0%	+7%
Staff Travel	NA	NA	NA	NA	NA	NA
Streetlighting	-62%	-74%	-61%	-73%	-61%	-71%
Waste	+5%	+5%	+15%	+15%	+26%	+26%
<b>Grand Total</b>	-	<b>-13%</b>	-	<b>1%</b>	-	<b>-5%</b>

### 1.6.1 Noteworthy Trends in the data

#### Sustained GHG reduction in Streetlighting

Significant and sustained GHG reductions are maintained in the Streetlighting focus area. This is due to the extensive, efficiency-focused LED conversion project in 2017 for the cobra head streetlights, and 2022 for decorative post-top lights.

#### Service growth and GHGs

Expansion of service has not increased GHG emissions in facilities and fleet focus areas. Kitchener is among the fastest growing communities in Canada and likewise City of Kitchener service delivery is expanding. We see growth in both facilities and fleet whose inventory of assets have both grown. Facilities has acquired new buildings as the City seeks to expand services to the community and since 2017, fleet has expanded its pool by 100 vehicles (an increase of nearly 20%). This decoupling of growth and GHG emissions is promising and can be sustained into the future by implementing Pivot: *Net Zero* actions.

#### COVID-19 Pandemic impacts on GHGs

The pandemic had significant impacts on service delivery. During this time fleet emissions increased slightly (3%) due to restrictions that limited one staff member per fleet vehicle. This resulted in workers driving alone in additional vehicles. In 2022, when operations returned to normal and the same restrictions were still in place, fleet emissions rose 17%. By 2023 the restrictions had been removed and fleet GHG emissions fell back down to pre-pandemic levels. By contrast, the facility shutdowns resulted in a significant reduction in electricity and natural gas consumption and an overall decrease in corporate GHG emissions of 19% (2020) and 13% (2021). Perhaps the biggest learning from Covid-19 and this body of work is that organizations can make swift and impactful decisions that impact corporate GHGs.

#### Electricity Grid

Ontario's Electricity Grid is known for being "clean," with nearly 90% of electricity coming from zero emissions sources, it currently has one of the lowest carbon intensity factors in the world. Since 2016



the grid has continued to improve – exemplified by a 30% reduction in its emissions factor between 2016 and 2023. This can clearly be seen in the City’s GHG emissions from electricity (Table 2). Between 2016 and 2023, our electricity consumption fell by 10%, however emissions fell by 34%. It is important to note the potential risks and benefits associated with changes in the carbon intensity of the electricity grid. Such changes are largely out of our control.

#### Heating Degree Days

Heating degree days (HDD) is a way of quantifying energy demand to heat buildings based on outside temperatures. During colder winters with more heating degree days, it is anticipated that energy consumption for space heating (i.e., natural gas), and the associated GHG emissions, would be higher. There were 2,142 HDD in the first quarter of 2022 and (Table 2) Kitchener notes a 4% increase in natural gas consumption and emissions. By comparison there were 1,179 HDD in the first quarter of 2023 and a 5% decrease in natural gas consumption and emissions.

#### Corporate and Community Emissions

Neither corporate nor community GHG emissions have experienced sustained reductions since their baselines. Both plans are entering second generation plans. Kitchener will need to make significant capital investments, strategic, systemic, and deeply integrated changes to corporate processes, business planning and policies along with the willingness to adopt and integrate promising solutions as they become available to make sustained GHG reductions. This second-generation plan seeks to orient the organization in the direction of making progress on a net-zero goal.

## 2 The Plan – Pivot: Net-Zero

### 2.1 Corporate priority pathways

In line with our Community Climate Action Plan called [TransformWR](#) there are three pathways to sustained GHG reduction that emerge as best bet pathways and as corporate priorities:

1. **Energy conservation/efficiency** - use less energy/demand less energy and use energy more efficiently
2. **Fuel switching** – shift to lower carbon energy sources, transition off fossil fuels
3. **Generate renewable energy** – generate energy from renewable sources

The plan of actions that follow seeks to prioritize these three pathways in City of Kitchener Facilities and Fleet & Equipment focus areas in order to best orient the organization towards a net-zero goal by mid-century. These actions and reporting on them covers the near, short, and medium term of 2024-2027. Actions are summarized in table format in Appendix B.

### 2.2 Facilities Focus Area

City facilities contribute the largest portion of Corporate GHG emissions while providing vital programming space and services to the community. Facilities account for 56% of Kitchener’s total corporate GHG emissions. These emissions represent the largest opportunity for GHG emissions reduction within City capital planning and operations. The magnitude of the pivot from an 8% corporate reduction target to net-zero facilities is significant. Sustained GHG reduction in facilities will be critical to reaching 2026 and 2050 targets.

The portfolio of the facilities focus area includes more than 60 major facilities spanning arenas, pools, community centers, libraries, performance spaces, office, and maintenance facilities. Most of these facilities are over thirty years old (average age approximately 42 years). Minimizing GHGs was not a priority at the time these facilities entered service. Facilities were designed almost exclusively to rely on fossil fuels for energy, especially natural gas for space heating, domestic hot water needs, arena refrigeration, and pool heating. Further to this, building insulation standards were not as efficient at that time. Fossil fuel reliance has been the default and most economical design choice in our community. The consideration of GHG emissions during facility design, construction and refurbishment is a newer practice for both the City and the building industry. Energy systems are continuing to change. The costs of carbon are anticipated to increase. Lower carbon technologies are increasingly being understood as important to ensure municipal service delivery is resilient in the face of climate change.

#### 2.2.1 Defining a Net-Zero building

The challenge is to bring the portfolio of facilities in line with the emissions reduction goals of the City of Kitchener. A Net-Zero Energy building is one which produces at least as much energy as it consumes annually. The strategy for achieving Net-Zero Energy is to reduce building operational energy as much as possible through an efficient building envelope, mechanical and electrical systems and then to install the required on-site renewable energy generation such as solar photovoltaic arrays to offset the remaining loads. A strategic approach which leverages policy, process, and planning, is required to develop the best path to GHG reductions within the City’s portfolio of facilities and make progress towards net-zero buildings.

### 2.2.2 Facilities Energy Management Program

Organizations often pursue energy efficiency, sustainability, and reduced carbon emissions because they are valued as the “right thing to do.” Financial impacts and long-term viability often determine which initiatives are pursued, including those for energy management. The benefits of improved energy management and energy performance in facilities will be monitored and communicated to enable data informed decision-making across the organization.

#### Energy Management Practices

Successful energy management requires vertical and horizontal involvement and commitment across an organization. Every level of the organization is responsible and can be accountable for ensuring continuous improvement and ongoing effectiveness of the energy management program. Staff are exploring ways to formalize and standardize our energy management practices. One possibility is following the process laid out by Natural Resources Canada’s 50001 Ready Navigator Canada. This free, on-line program provides step-by-step guidance on implementing an energy management system and building a culture of structured energy improvement that are anticipated to lead to deeper and sustained savings without requiring external audits or certifications.

#### Energy Management Policy

To support the integration of best energy management practice and integrating data into decision making, an energy management policy is proposed. This policy is intended to formally define the energy data collected, targets and objectives for energy use, and provide direction on data driven energy decision making.

#### Energy Management Monitoring System

The collection and use of corporate utility data is cumbersome, especially for facilities. Facilities Management and Sustainability Office staff will lead the development of a corporate energy management monitoring system. In this way all energy consumption across the organization can be brought together, monitored, and analyzed to support more integrated and informed decision making across the organization. The GIS team is well positioned to improve the current monitoring. The goal will be to streamline this data collection across City facilities and provide a central database where this data can be reviewed on a regular basis to provide up to date reporting on the performance of City facilities and support informed decision-making.

#### Facilities Energy Management Technical Advisory Committee

The Facilities Energy Management Committee consists of facilities staff who support strategic planning and implementation of GHG reduction in facilities. The goal is to reduce the GHG emissions of City facilities with cost-effective, safe, practical, and maintainable technologies. The committee seeks to provide a forum for feedback between facilities design and operations/maintenance groups, provide input and ideas on facilities energy (HVAC, Electrical) projects, comment on design options for planned projects, identify new projects/opportunities for improvement, discuss risks and rewards of new technologies.

### 2.2.3 Corporate Green Building Standard

The development and implementation of a Corporate Green Building Standard will provide clear guidance to City projects including new buildings and existing building retrofits. Setting specific targets for energy efficiency and sustainability goals will help ensure new projects and renovations are

contributing to corporate GHG emissions reduction goals. The project will engage a consultant to develop this standard and to provide financial implication information to allow for energy performance targets within this standard to be identified and achieved. Funding for this body of work was approved in 2024 budget.

A community green development standard is currently in development across our region led by WRCommunity Energy. Best practice when implementing a community standard is that the municipality first enacts a more stringent internal standard. The internal standard development intends to coordinate with the community standard development to demonstrate City leadership in this area.

#### 2.2.4 GHG Reduction Pathway Development

A suite of City of Kitchener’s highest GHG emitting facilities (across the portfolio of Kitchener Arenas, Administrative Buildings and Pools) will be grouped together to identify a strategic sequence of GHG reduction measures called “the GHG reduction pathway.” This will expedite corporate GHG reduction while supporting the management of capital costs and reducing operating costs. It is anticipated that the recommended measures will be replicable to other City facilities within the same facility type across the facilities’ portfolio. This work is essential to integrate energy and GHG reductions into longer-term Facilities’ capital planning. The goal is the development of a long-range capital asset management plan (AMP) for each facility to achieve GHG reductions. The development of these plans will be a multi-year project.

Staff intend to work with a consultant (funds allocated in 2024 budget) to prepare application to FCM’s Community Buildings Retrofit (CBR) initiative/ GMF GHG Reduction Pathways grants. Bundling the studies on these facilities would maximize grant funding eligibility and provide the most actionable information to the City for the least investment.

#### 2.2.5 Arenas Strategy

This strategy is intended to inform, and guide integrated and informed strategic action in Kitchener’s existing arenas. Energy, asset management, community service delivery needs, and programming will be integrated into this strategy. This is the top immediate priority due to the GHG emission per square foot of facility and the relatively simple payback period.

#### 2.2.6 Pool Strategy

Like arenas, pools are heavy energy consumers and given their unique systems and functionality, will require special attention to strategize their best path(s) towards net-zero. In doing so, a similar approach to the Arenas Strategy described above should be employed, with a target completion date of 2026.

#### 2.2.7 Facility Acquisition & Decommissioning Policy

Existing buildings can prove extremely challenging to retrofit whether the focus is GHGs or related to other priorities such as accessibility, programming needs and new legislation. As part of a more strategic, integrated, and coordinated asset management plan of our facilities, the development of a Facility Acquisition Policy, and a Facility Decommissioning Policy is recommended. This is expected to support more informed decision-making in prioritizing investment in facilities.

### 2.2.8 Solar Strategy

Photovoltaic solar panels are a robust, mature technology for the generation of local renewable energy. In 2011 the City installed its first (and only) solar array at the Kitchener Operations Facility under the feed-in tariff (FIT) program developed to encourage and promote the use of renewable energy in Ontario. In 2023 the 2,660-panel array generated 615,126 kWh of electricity, all of which was exported back into the grid, resulting in approximately \$390,605 of revenue. The FIT program ended in 2016 and it is anticipated that future arrays will not generate as much revenue. Current regulations allow for net-metering at the facility level (generating credits for each unit of electricity a facility produces and exports to the grid and debits for grid electricity used reducing the overall facility consumption).

To expand the use of solar at City facilities, the proposed Energy Management Program includes provision for the development of a solar strategy by a consultant (funds approved in 2024 budget). This body of work will include a high-level scan of City facilities to identify and rank the best Kitchener facilities and locations (e.g., roof mount, ground mount, over-parking canopy) to deploy solar panels. The highest ranked locations would then receive further design and investigative work including panel layout, costing, grid connection investigation, and structural sign-off, and timing with other capital improvements (e.g., roof membrane or asphalt replacement). The end product will identify the best projects for the City to pursue, well defined, costed, and ready for implementation. Locations at other facilities would be ranked to provide a roadmap for future implementation. Outcomes would inform a future funding request to support implementation.

### 2.2.9 HVAC fuel switching modelling

2024-2027 HVAC projects are currently in the design phase, with both BAU (Business As Usual) and energy upgrade options being costed in preparation for tender in 2024-2027. It is expected that the HVAC equipment being replaced now will be in use for up to 25 years, making the timing for energy upgrades optimal. Approved in the 2024 budget is funding for energy modelling consulting work to provide information on HVAC upgrade options. This will support decision making on energy and GHG reduction investments in our facilities, through an informed, data driven and cost-effective process.

### 2.2.10 Ice Resurfacing Pilot

A pilot program is underway exploring the use of mechanical de-aeration for ice resurfacing water. This has the potential to significantly reduce the GHG emissions of arenas as the use of cooler water for resurfacings saves energy by reducing the amount of water heating needed and a reduced load on the refrigeration plant. Currently this is being trialed at one location. If the pilot is successful, this will be implemented at other arenas.

### 2.2.11 HVAC Fuel Switching

Several facilities throughout the City are undergoing a conversion of their Heating, Ventilation and Air Conditioning (HVAC) systems from natural gas to heat pump systems. These replacements are made when equipment is scheduled to be replaced. Fire Headquarters and Forest Height Community Centre are locations where conversions are underway. These facilities will serve as pilot projects to explore the installation costs, maintenance requirements and any challenges to conversion.

## 2.3 Fleet and Equipment

In this focus area, the same pathways to net-zero apply. The City is focusing on fuel efficiency, transitioning away from fossil fuels, and seeking to integrate renewable energy generation and energy storage to support this transition.

### 2.3.1 Fleet Asset Management Plan

The most recent Fleet Asset Management Plan was completed in 2018 and is due to be updated based on a 5-year revision timeline. This work will offer a holistic view of fleet and its assets and position fleet well to make decisions regarding reducing GHGs as a priority.

Updating the AMP will provide the opportunity to capture EVs within the AMP, along with their estimated service lives and document any operations and maintenance activities. The AMP would do well to also include a longer-term replacement forecast with estimates for what/when certain vehicles may transition to electric, or other zero-emissions options (e.g., hydrogen). This exercise would help to define an infrastructure replacement gap and position the fleet division well in seeking additional capital funds or other means of financing as needed. This work would also support the establishment of a well-defined asset inventory. This work is currently underway and will be complete by the end of 2024.

### 2.3.2 Fleet Efficiency

#### Fleet Telematics

One hundred percent of City of Kitchener on-road fleet vehicles are equipped with telematics devices that provide valuable data on fleet fuel consumption and driving behaviors including excessive idling, harsh acceleration, harsh braking and speeding – all of which can result in increased fuel consumption and GHGs. With this data in hand, fleet supervisors can identify and support improving these behaviors on a driver-by-driver basis.

#### Fleet Users Working Group

The fleet users working group (FUWG) meets monthly and includes management from different divisions that use fleet vehicles and equipment for service delivery. This provides the opportunity for common issues amongst fleet users to be brought forward and discussed with input from multiple divisions at the same time. Considering Fleet’s responsibility to reduce GHG emissions from vehicles, the FUWG is an excellent existing conduit to support discussing fleet related matters including energy use and reducing GHG emissions from fleet.

#### Corporate Fuel Efficiency Policy

The Corporate Fuel Efficiency Policy (#316) is in place to educate and outline the responsibilities and obligations of employees who drive or operate City of Kitchener vehicles and equipment, with respect to optimizing fuel efficiency. For instance, the policy states that vehicles shall not idle for more than 10 seconds, shall not exceed a maximum road speed of 90km/hr., and that harsh braking and cornering shall be minimized. The policy also includes guidelines for vehicle and equipment acquisition. Currently, the policy indicates that the City will purchase hybrid vehicles whenever possible. Staff intend to review the policy in 2024 and update this to electric, to align with the approach to “electrify where and when possible”.

### Fleet Driver Training & Corrective Procedures

The Fleet Safety and Compliance team is responsible for the delivery and preparation of the Defensive Driver training course which all fleet users are required to complete at onboarding and every 3 years during their tenure with the City. This course discusses driving behaviors that can increase fuel consumption and helps to enforce the corporate fuel efficiency policy. For instances where driver behaviors are not meeting expectations, fleet developed a Guidelines for Addressing Unacceptable Driving Behaviors, to be used to ensure corrective measures are taken in a fair and consistent manner for all drivers.

Additional free training resources exist including the SmartDriver training program offered by the federal government. These resources could be used to supplement existing training or as a remedial action for drivers whose behaviors are not improving with other interventions.

To improve the outcomes of training and to have better adherence to the Corporate Fuel Efficiency Policy, the fleet user working group will consider strategies to improve driver behaviors for each relevant behavior (e.g., ways to further reduce idling).

### Right-sizing

An effective way to reduce fuel consumption is by ensuring the right vehicle is being used for the right job. There are currently some fleet vehicles in use that are over-sized for their use. Staff intend to complete an audit of these vehicles to identify which ones may be replaced with smaller alternatives. It is anticipated the Sustainability Office will support this work with Fleet as lead in 2024.

### Efficient Route Planning

Efficient route planning saves both time and fuel. Fleet, in collaboration with the fleet user groups, can assess opportunities for route optimization.

### Fleet Equipment Review Process

The Fleet Equipment Review is an annual process that is followed to identify which fleet vehicles and equipment need to be replaced, which can be deferred for replacement and where any fleet vehicles need to be added. The process also identifies vehicles that could be replaced with a smaller unit (i.e., right-sizing) and identifies which units that have been flagged for replacement can be replaced with an electric or hybrid equivalent.

### 2.3.3 Fuel Switching

While electricity is a key energy source in our fleet's energy transition, it is not the only one expected to supply our fleet and equipment with lower carbon energy solutions. Evaluating shifting to transitional fuels is part of the fuel switching pathway especially for vehicle types where the marketplace does not offer ready options. Examples of transition fuels currently in use include propane, biodiesel 5 and 20.

### Electrifying vehicles and equipment

Since 2017, 14 battery electric (BEV) cars and two battery electric cargo vans have been added to the City of Kitchener fleet, resulting in a 75% reduction in operations and maintenance costs when comparing BEV cars and their traditional internal combustion engine (ICE) counterparts. This year (2024) the City plans to transition several cargo vans and two ice-resurfaces to electric. These efforts continue to contribute to the City's progress in achieving Transform WR action 2.1.2 to "Plan and begin to implement a transition to zero-emission vehicles for municipal fleets, working towards a goal of at least



half of municipal vehicles being zero emissions by 2030”. When considering only cars in the fleet, this goal has already been achieved, however when looking at all passenger fleet vehicles, only about 4% are electric or zero-emissions.

There is also a concerted effort to electrify small hand tools and equipment, turf maintenance equipment, as well as utility vehicles as these are widely available and there is budget to procure them. Like vehicles, there are some limitations to electrifying smaller equipment, particularly battery life – which is not long enough to support some crews for an entire shift (e.g., parks and forestry). Staff will continue to seek options and opportunities to remove this barrier (e.g., through seeking opportunities for more integrated and mobile charging solutions).

### EV Charging Infrastructure

Along with BEVs, the City owns 45 EV Charging Stations at various locations throughout the City. Most of these stations are fleet facing only with a small number available for public use. Twenty of these stations were added to the network through the Zero Emissions Vehicle Infrastructure Program (ZEVIP) funded by Natural Resources Canada which the City received in 2021. There is one level 3 charger at the Kitchener Operations Facility, and the remaining ports are for level 2 charging.

### EV Charging Station Asset Management Plan

While fleet vehicles are not new corporate assets, the charging infrastructure to support them is relatively new. Installing, owning, and managing EV chargers is a new responsibility within the organization. The development of an asset management plan for this infrastructure will support the management, maintenance, and decision-making about the future charging infrastructure system. Decisions such as sizing, capacity, and geographic spread of the stations, creating a forecast for replacements, further deployment and to enable more integrated charging systems with solar and battery potential on location. This work will be supported by the Sustainability Office, Fleet, GIS, and Asset Management and is anticipated to be complete in 2025.

### Zero Emissions Vehicle (ZEV) Transition Strategy / Sustainable Fleet Strategy

Building on the work of the Fleet AMP and EV Station AMP, a ZEV Transition Strategy will help to position fleet to both electrify fleet vehicles and look forward to implementing other zero-emissions technologies as they become available. This will also help prepare for Provincial and Federal targets for ZEV sales with more models anticipated. In December 2023, the Federal Government put in place a sales mandate to ensure at least 20% of new light-duty vehicles sales will be ZEV by 2026, at least 60% by 2030 and 100% by 2035. Also outlined are goals for medium and heavy-duty vehicles – including a 100% sales target by 2040 for a subset of vehicle types based on feasibility. Fleet has already exemplified their commitment to electrifying vehicles and equipment where currently feasible, this strategy can provide the opportunity to explore solutions for user groups facing operational constraints to electrification.

Another key component of this work will be to assess infrastructure needs (EV Charging Station) as the electrified fleet expands. Attention will be given to the capacity of our network of charging stations, and also the electricity grid. This work will need to engage with Enova and other local energy stakeholders to ensure the pace we electrify is in line with the power supply. This project will be completed by an external consultant in 2025 and managed by Fleet with support from the Sustainability Office.



## Alternative Fuels

### *Lower Carbon Fuels*

Acknowledging the limitations heavier-duty vehicles have when it comes to zero-emissions options, alternative fuels can be an effective and simple way to reduce emissions in this vehicle category. Drop-in fuels, or those that can be used one-for-one without having to make changes to a vehicle are particularly attractive given the simplicity in implementing them. The fuels listed below are examples of temporary emission reduction measures until zero-emission options are available across the entire fleet.

#### Biodiesel 5, Biodiesel 20, and Ethanol Blend 10%

Since 2011 fleet has been using biofuel blends to replace traditional petroleum diesel and gasoline. These have mostly included Biodiesel 5% and Ethanol Blend 10%, replacing the majority of traditional diesel and gasoline, respectively. In addition to having a slightly lower emissions factor compared to their full petroleum counterparts, the biodiesel or biofuel components are made from renewable sources (e.g., vegetable oil), are biodegradable and are generally less toxic. A Biodiesel 20% blend (which has lower emissions than a 5% blend), is used instead of Biodiesel 5% in the summer months (May – October). It can only be used during this time as it is less stable than Biodiesel 5% and does not perform well in colder temperatures.

#### Renewable Diesel

One limitation to biodiesel blends is that higher concentration blends are not stable in colder temperatures. An alternative that performs better in colder climates is renewable diesel. Like biodiesel, renewable diesel can be made from feedstocks such as vegetable oil, however it is processed in a different way resulting in a product that does not have the same limitations as traditional biodiesel blends. Further to this, renewable diesel does not need to be blended with petroleum diesel, resulting in an even lower emission factor up to 70-80% below traditional petroleum diesel.

#### Propane

Fleet has also introduced the use of propane by retrofitting existing diesel vehicles to run on propane – which has an emission factor approximately 30% lower than diesel. Propane will continue to be relied on as a temporary emission reduction measure until other opportunities present.

#### Compressed Natural Gas

Compressed natural gas (CNG) is another lower-emission alternative that has a similar emission factor to propane. In the past City of Kitchener has used CNG for fleet fueling, however it has not been used in more recent years. Staff intend to assess the re-introduction of CNG as a fleet fuel based on the upfront cost to install fueling stations, retrofit new and existing vehicles, GHG reductions, and the operational costs/savings (fuel, maintenance, etc.) over the lifetime of a vehicle.

### *Zero Tailpipe Emission Fuels*

#### Hydrogen

There is potential for hydrogen to play a role in many sectors as they move towards a net-zero future. The Province of Ontario and Government of Canada alike have Hydrogen strategies that outline its importance for decarbonizing several industries, including transportation. Considering Ontario's relatively "clean" electricity grid, it is well positioned to produce and store green hydrogen which uses electricity at off-peak times to separate pure hydrogen gas (H<sub>2</sub>) from water (H<sub>2</sub>O). The City of Kitchener

has already proven its interest in hydrogen by partnering with the University of Waterloo on a feasibility study to produce and store hydrogen within the City.

In the context of the City's fleet, hydrogen may be a more realistic zero-emissions solution for heavier-duty vehicles that face limitations to electrification (vehicle size, climate, etc.). Hydrogen-fuel cell electric vehicles (FCEV) that use hydrogen to produce electricity on board are fairly limited in supply, but more are becoming available. Another option may be to use hydrogen-diesel co-combustion which involves retrofitting existing diesel vehicles with a conversion kit, allowing hydrogen to supplement diesel usage. Staff will continue to assess the feasibility of piloting this emerging technology.

#### 2.3.4 Fleet Integrated Renewable Energy & Storage Systems

As the electrified fleet continues to expand, attention will need to be given to the impact this will have on the wider electricity grid. This challenge can provide a chance to explore innovative solutions with Enova and other local energy stakeholders. These include Energy Storage, Vehicle to Grid Initiatives and Integrated Energy Systems.

All these solutions rest on the same idea – to supplement on-peak electricity demand and provide a load displacement opportunity. For instance, the Kitchener Operations Facility already has 25 EV charging stations. Another large influx of chargers and thus demand on the electricity grid may pose some issues when it comes to supply. On-site solutions for energy storage (batteries to store electricity generation during off-peak times), or energy generation (solar to charge BEVs, excess stored in batteries or put back into the grid), can position the City well to confidently expand their electrified fleet.

### 2.4 Streetlights

Streetlights have completed an extensive retrofit to LED lighting. Annually, approximately 50% of the utility cost avoidance from the Streetlight LED Light Retrofit Management Project is directed to the energy reserve fund. More recently ornamental street lighting was also converted to LED and once debt is paid off, it is anticipated that 50% of these energy savings will transfer to the Energy Reserve Fund as well.

### 2.5 Staff Travel

This new focus area offers a more wholistic view of staff travel to deliver service to the community by including personal vehicle use. The City of Kitchener is a member of TravelWise, an internationally recognized workplace program available to employers across Waterloo Region. The program aims to encourage employees to take transit, cycle, walk and carpool to work instead of driving alone. This program supports staff using active transportation for work-related purposes, including a corporate GRT Transit Pass, carpool matching software and reimbursement for emergency rides home.

### 2.6 Corporate Waste

Waste generated within City facilities and in public spaces including parks and at road-level is collected by varying City divisions and third-party haulers before making its way to local transfer stations. Waste generated outside facilities and waste generated inside facilities will require different approaches when it comes strategies to reduce waste production.

The City is legislated under Ontario Regulation 102/94: Waste Audits and Waste Reduction Workplans to conduct an annual waste audit for City Hall. This report not only estimates annual waste production and

diversion rates at City Hall but makes recommendations for a waste reduction work plan. Some specific recommendations of the Waste Reduction Work Plan in the 2022 Audit include:

- Consider targets for diversion rates for different waste streams including mixed recyclables (95%), compostable fibers (85%), food/organic waste (90%)
- Education and promotion regarding waste reduction

Conducting a Corporate Waste Assessment is a next step for the organization in gathering a wholistic view of corporate waste management ahead of identifying opportunities and strategies for reduction and diversion.

## 2.7 Implementation

### 2.7.1 Capacity Building, Readiness and Timing

The timing and deployment of actions can depend on internal and external factors. Internally these may include resource capacity related to finances, staffing and staff literacy. External factors include market readiness (e.g., zero-emission vehicles options), partner availability and legislative requirements. Staff will continue to build capacity and support readiness to accelerate action implementation.

#### Corporate Climate Change Literacy Modules

Staff are working to develop a literacy module to be delivered via the City of Kitchener's Learning Management System (LMS). The introductory module is designed to inform staff on the impact of burning fossil fuels, local impacts of climate change, our sources of Corporate GHG emissions and pathways to net-zero. Participants will be more aware and more likely to consider climate action not only in their work, but also at home.

Upon the successful roll-out of Module #1, staff will work to develop additional modules to introduce specific work the City has done to reduce GHGs and to develop an internal conduit to deliver content to ensure staff across the organization are aware of and up to date on matters of sustainability within a municipal setting.

### 2.7.2 Partners and Engagement

#### Project Teams and Staff

All actions in this plan rely on collaboration across departments and some also benefit or rely on cross organization and/or sectoral collaboration in the community. Staff will continue to identify and bring the right people to the table to accelerate and implement the work.

#### Kitchener Climate Change and Environment Advisory Committee

In August 2022, the Terms of Reference for this long-standing environmental-related advisory committee was expanded to include supporting and advising Council on implementing climate change goals and policies. Staff will continue to engage this advisory committee on implementation of this and other related work.

#### Community

Staff will seek to engage the public in this work. It is important that the community and facility patrons understand the contribution our facilities and services make to corporate GHGs and the kinds of changes that will support GHG reduction. Community members are partners in this work.

### Data holders

Kitchener Utilities, Kitchener Fleet Systems Specialists, local School Boards and Enova hold key utilities consumption data in support this work. There is a need to continue to prioritize support for the systems and staff capacity that maintain and share this data.

For City facilities that are operated by another party and there is utilities cost recovery or sharing arrangement in place, staff will seek third party utilities data sharing arrangements for The Museum, Kitchener Public Library, Centre in the Square, Conrad Centre for Performing Arts, Homer Watson Gallery House, and the Gymnastics / Judo Centre.

### Enova

Staff will continue with quarterly meetings with Enova staff to ensure continued information sharing as we continue to electrify and expand our renewable energy production including solar power generation.

### SWR

Sustainable Waterloo Region (SWR) is a social enterprise nonprofit. The City of Kitchener is a pledging member of its Impact Network (formerly Regional Sustainability/Carbon Initiative). Their program offerings focus on organizational sustainability practices and target setting, commuting options, regenerative building practices, community greenhouse gas impacts, and electric vehicle adoption.

City of Kitchener will continue:

- To maintain its membership and revise its corporate target within the Impact Network with Council support of this report,
- Yearly reporting in SWR's Annual Member Survey,
- Its membership in Travelwise,
- To leverage the Drive Zero program building corporate literacy and support for net zero vehicle adoption.

### Research and Innovation Partners

Staff will continue to work with universities, colleges, and local business/innovation sector to accelerate climate action.

#### 2.7.3 Funding Net-Zero

##### Expanding existing Funding Sources within our control

Climate action as described in this plan is an investment. Municipalities are scaling up and directing funding sources within their control to accelerate corporate climate action work. For the City of Kitchener to be successful in moving towards net-zero by mid-century, funding for the work must be prioritized. It is estimated that \$250M in additional capital funding is needed over the next 25 years or \$10M/year. For context, a 1% increase to the City's tax rate generates \$1.6M in additional revenue. There is an urgent need to assess the potential and value of establishing additional funding from sources within our direct control.

##### Energy Management Reserve Fund

The total current asset replacement value (CRV) of City-owned facilities equals \$1,950 million. Facilities receive annual average funding of \$12.3 million, significantly less than the 2016 Canadian Infrastructure Report Card (CIRC) recommended reinvestment rate of 1.7%-2.5% of CRV, which would maintain

facilities in a state of good repair. This funding difference results in a significant annual funding gap, and the addition of GHG reduction measures will further increase this gap. However, as asset management practices mature organizationally, and strategies that prioritize and align capital renewals with GHG reduction pathways are employed, it is expected that the funding gap can be reduced while also achieving GHG reduction targets. Currently this reserve fund invests in work that supports the net-zero facilities pivot along with other related works across the organization.

Due to progress made across our assets, projects with a short-term ROI, often called “low hanging fruit” are now limited across the organization. Considering this and in preparation to support the necessary framework and projects of CorCAP2.0, a second-generation Reserve Fund Policy FIN-RES-2036 was endorsed by CLT with an administrative policy update on November 22, 2023. The priority focus for project funding from the Reserve Fund is to support projects that enable:

- a. Energy conservation (using less energy, using energy more efficiently)
- b. Fuel switching (conversion to lower carbon energy sources)
- c. Generating renewable energy (local renewable energy for corporate use)
- d. Funding consultancy to support projects that are anticipated to enable a, b, c, or e.
- e. Identify and provide matching funds for related grant applications /external funding opportunities to enable a, b, c, or d.

Facilities-related projects seeking funding will be evaluated by prioritizing projects resulting in the greatest reduction in GHG emissions. Any projects with a short-term ROI (1-5 years) will also be prioritized to accelerate available funds in the reserve and continued progress. Projects with a longer ROI will not be excluded.

The Funding sources for the Reserve Fund have expanded to include:

1. Streetlight LED Light Retrofit Management Project utility cost avoidance (annual transfer of approximately 50% of total cost avoidance)
2. FM utility accounts (water, natural gas, electricity, and propane) (annual transfer target at 75% of total cost avoidance)
3. Budget adjustment from FM utility accounts (permanent budget reallocation)

These new funding sources support accelerating the most impactful projects anticipated to result in reducing corporate GHG emissions. An SOP and project evaluation form will complement the policy. The policy is set for review in November 2026.

### Fleet Replacement Reserve Fund

The entire City of Kitchener fleet is valued at approximately \$75 million and average annual funding of approximately \$7.5 million is used for vehicle replacements and additions to the fleet. Fleet replacements and additions are funded by the Fleet & Equipment Replacement Reserve Fund which is financed by fleet user groups based on straight line depreciation of their vehicles. In other words, every year user groups pay into the reserve an amount equivalent to the yearly depreciation of their vehicles. Acknowledging the higher upfront costs of EVs (approximately 20% higher than traditional ICE vehicles), and the capital investment needed for infrastructure to support them (e.g., EV charging stations); each year a portion of the Reserve Fund (\$50,000) is allocated to support initiatives for greening the City fleet. Despite this, the Reserve is still underfunded due to inflationary pressures across the entire new vehicle market in addition to higher up-front costs to replace ICE vehicles with BEVs. These factors have combined to accelerate the annual spending against the Reserve which is now anticipated to fall into a

deficit by 2026 including an annual greening the fleet funding gap of approximately \$200,000. To address this, the 2024 budget has approved \$320K from Fleet Capital Reserves for upgrades to fleet vehicles projected to have a GHG reduction of 38 t CO<sub>2</sub>e compared to the ICE equivalent. However, this is a one-time influx of funds, and thought must be given to other funding mechanisms to help close this funding gap over the longer term.

### Grants

Grants while not a sustainable source of funding have and do play an important role in accelerating corporate climate action work. It is supportive to continue to prioritize corporate administrative support for grant applications.

### Advocacy

In addition to pursuing funding opportunities through government grants, advocacy efforts will be important at all levels of government. The City's efforts to reduce GHG emissions ladder up to Canada's Agenda 2030 and its commitment to reach net-zero greenhouse gas emissions by 2050. Advocacy will include communicating our goals and progress to government. Communicating with policy makers will help to connect mutual priorities clearly and purposefully.

## 2.7.4 Future Considerations

### Refrigerant Fugitive Emissions

Direct (Scope 1) fugitive emissions from the leakage of refrigerants are a future work consideration. Refrigerants are used for arena ice-making and facility HVAC systems. Use of refrigerants in our facilities is expected to increase over the coming years as additional heat pump systems are installed. The Global Warming Potential (GWP) of proposed refrigerants should be reviewed and lower GWP refrigerants should be selected where available. Future work could include the addition of reporting of these emissions in Scope 1 and creation of standards for directions of refrigerant selection.

### Embodied Carbon

Embodied carbon factors in the carbon emissions resulting from the raw materials, manufacturing and transportation associated with building materials and supplies. As transparency in the supply chain of materials improves, more opportunities are anticipated to emerge that will enable bringing embodied carbon into decision-making. How to calculate/incorporate the embodied carbon of procured products, how the supply chain can enable increasing transparency and tools that can enable embodied carbon to be more easily factored into product procurement decisions is recommended for future consideration as it is anticipated that over time industry will enable this level of transparency and accountability to be possible. The procurement bylaw may be a place to include such considerations in the future. Staff propose reporting on an embodied carbon indicator for new construction as this is achievable when included as part of the scope of work for any new build.

### Offset Policy

Carbon offsets can either be bought or sold by an organization – acting as a mechanism to reach emission reduction goals when additional absolute reductions become difficult to achieve or be used as a source of revenue. In the case of the City of Kitchener, offsets may be considered as a final option, bridging the gap between “as close to zero as possible,” (through efficiency, fuel switching and generating renewable energy) and net-zero. Offsets are beyond the scope of Pivot: Net-Zero, however

the City should be positioned to integrate them in future emission reduction strategies (or revenue streams).

## 2.7.5 Informed and Integrated Decision Making

### Policy Alignment

Moving beyond the actions listed in this report, the organization will continue to seek ways to embed into every decision, the climate action direction set by Council.

### Strategic Planning, Business Plans and Budgets

Business plans, workplans and budgets across the organization will invest in and accelerate high priority GHG emission reduction and renewable energy opportunities.

## 2.7.6 Accountability and Reporting

### External Reporting Frameworks

#### *Legislated*

For municipalities in Ontario, sustainability and climate change planning and reporting remain voluntary, except for O Reg 507/18, which was revoked in 2023 and replaced by O Reg 25/23: Broader Public Sector: Energy Reporting and Demand Management Plans. The regulation defines what public agencies (including all municipalities) must report on regarding energy usage in their facilities, including a summary of annual greenhouse gas emissions, and a description and results of any energy saving activities. The next mandatory reporting cycle is July 2024.

#### *Voluntary*

The City of Kitchener currently reports into two voluntary reporting frameworks – Partners for Climate Protection facilitated by the Federation of Canadian Municipalities (PCP) and Sustainable Waterloo Region's (SWR) Impact Network.

The PCP program has five milestones from creating a baseline emissions inventory to monitoring and reporting results – this report is intended to fulfil milestones 1 – 3.

SWR's Impact Network involves yearly reporting to SWR on GHG emissions and reduction targets, as well as projects the City would like to highlight. This provides the opportunity to benchmark ourselves against local peer municipalities.

### Internal Reporting Frameworks

#### *Carbon Budgets*

A carbon budget is a lagging indicator and difficult to measure. It is not anticipated to meaningfully drive decision making and therefore is not a focus for our organization. Broadly the overall trend towards net-zero over time is an important lagging indicator to follow. Staff intend to report the most recent year's data around Earth Day (April 22) each year, as outlined in the following section.

#### *Reporting on Progress towards Net-Zero*

There is a growing commitment to measure climate action progress and impact. The CorCAP 2.0 seeks to develop and establish an evolutionary practice to drive the direction we want to join. Some indicators presented below will look back at whether the intended result was achieved. They are not predictive, but such indicators do clarify and confirm patterns that are occurring over time and may be in progress



(lagging indicators). By contrast other indicators look ahead, anticipate trends, can be predictive and relevant to our objectives, informing direction towards or away from objectives. These indicators (leading indicators) can evolve over time as the organization's needs change and the work matures.

Currently there is useful data being collected regarding our fossil fuel use and our progress towards net-zero. To date, the data has not been analyzed, integrated, or utilized to inform corporate decision making. This is the intent of this second-generation CorCAP. Indicators currently available to the organization which support gauging progress include corporate and division (even facility and equipment level) information. Strategically aligning and integrating reporting across the organization will serve our progress monitoring well. Yearly, for the most recent year of data in time for Earth Day the Sustainability Office will report on the following corporate indicators:

#### Corporate

- Total Consumption by Energy Source (GJ)
- Total corporate electricity costs (\$)
- Total corporate natural gas costs (\$)
- Total corporate propane costs
- Total gasoline costs (\$)
- Total diesel costs (\$)
- Total GHG emissions by Energy Source (Tonnes CO<sub>2</sub>e)
- Total GHG emissions by Corporate Focus Area (Tonnes CO<sub>2</sub>e)
- Renewable Energy generated (solar kWh)
- % of Energy consumption from fossil fuel sources
- City of Kitchener New Construction as designed Embodied Carbon (Tonnes CO<sub>2</sub>e)
- Corporate Spending on Carbon Pollution Pricing
- Social cost of emissions from annual City energy usage (\$)

#### Focus Areas

At the next level of granularity, Indicators at the divisional level that complement this work and will be reported annually include:

#### Fleet

- Total Energy Use by Fuel Type (unit) – by fleet vehicle type
- Energy/GHG per km
- % ZEV fleet and equipment
- % of Zero emissions light duty vehicles

#### Facilities

These indicators will be reported in the Facilities Asset Management Planning in Levels of Service annual reporting.

- Utility cost (Annual cost of energy \$, Energy Cost per Intensity \$/m<sup>2</sup>)
- Annual building energy consumption (all fuels) (GJ)
- Annual GHG emissions by facility (Tonnes CO<sub>2</sub>e)
- Annual GHG emission intensity by facility (kgCO<sub>2</sub>e/m<sup>2</sup>)
- Cost/Energy/GHGs by facility per hour of operation (arenas, community centres)



## CorCAP 2.0 – Pivot: Net-Zero (2023-2027)

- Renewable Energy Generated (kWh)

### *Project Level Indicators*

To aid in decision making at a project level, where possible the following indicators may be included:

- Return on Investment (years)
- GHG Reductions / \$ spent

### *Reserve Fund Indicators*

Reserve fund indicators are reported on annually by finance as part of the Budget process.

## 2.8 Conclusion

In summary, these recommended actions position the City of Kitchener to pivot in the direction of net-zero. Across the entire organization we will strategically advance actions that enable the City of Kitchener to be more energy efficient, fuel switch and generate renewable energy while working towards a net-zero future for our organization.

### 3 APPENDIX A – Corporate GHG Inventory, Baseline Adjustments & Methodology

#### 3.1 Methodology

GHG emissions have been calculated using consumption data collected from utility bills for electricity and natural gas, and from FLINT for fleet fuels. Table 3 below outlines the emission factors used to convert consumption data into GHG emissions for 2023. The most up to date emission factors published by the Governments of Canada and Ontario have been used. For staff travel, an average emission factor based on a variety of makes and models was used.

**Table 3 - Emission Factors**

Energy Source	Unit	Emission Factor (g CO <sub>2</sub> e /unit)
Electricity	kWh	0.03
Natural Gas	m <sup>3</sup>	1.93
Biodiesel 5	L	2.70
Diesel	L	2.71
Ethanol Blend (10%)	L	2.24
Gasoline	L	2.32
Propane	L	1.54
Electricity	L	0.03
Staff Travel	km	0.19
Waste	mt	481.70

#### 3.2 Assets in the GHG Inventory

To track and report on our Corporate GHG emissions consistently from year to year, it is important to have a well-defined inventory of assets and sources that are included and updated in corporate GHG reporting. Table 4 below outlines the assets and sources reported on in each focus area.

**Table 4 - Assets and Sources included in GHG Inventory**

Focus Area	Sources
<b>Facilities</b>	85 facilities
<b>Corporate Fleet &amp; Equipment</b>	All on-road heavy, medium, and light duty vehicles and off-road equipment (loaders, backhoes etc.) that use 6 different types of fuel. Given the process by which small handheld equipment is re-fueled, it is difficult to accurately track their fuel consumption and therefore handheld equipment is not included in the GHG inventory for fleet.
<b>Streetlights</b>	Outdoor Streetlights
<b>Waste</b>	Waste collected from city facilities and street level / park waste receptacles including large Moloks.
<b>Staff Travel</b>	Staff mileage claims for work-related, personal-vehicle use

### 3.2.1 2016 Baseline Adjustment

The Facilities Inventory that was used in the 2016 GHG Inventory (our baseline year) omitted several buildings when compared to the 2022 inventory. This omission makes it difficult to make a fair comparison and track progress on our current target of an 8% reduction by 2026, net-zero by 2050 and any interim targets yet to be set.

To address this challenge the 2016 Baseline year has been adjusted using the subset of emissions from buildings *not* in the 2016 inventory, but that were in the 2022 inventory, when the criteria for inclusion was formerly endorsed and applied to this reporting. Only buildings that were under the City’s ownership/control in 2016 and therefore would have met the Facilities Inclusion Criteria, were used. In certain cases where major renovations or retrofits were identified that would have impacted energy consumption, data from before the work took place was used. Considering this, eighteen buildings were used in the adjustment calculation. The sum of their 2022 (or earlier) emissions was simply added to the facility GHG emissions initially reported on in 2016.

- 44-50 Gaukel Street Commercial
- 79 Joseph Street Commercial
- Bridgeport Child Care Centre
- Cameron Heights Pool
- **Centre in the Square**
- Downtown Community Centre
- Grand River Recreation Complex
- Gymnastics/Judo Centre
- Harry Class Pool Pumphouse
- Homer Watson House and Gallery
- Huron Natural Area Comfort Station
- **Kitchener Public Library**
- The Boathouse
- The Registry Theatre
- The Museum
- Victoria Park Comfort Station Jubilee
- Victoria Park Machine Shop
- Victoria Park Pavilion

The 2 facilities in bold above are buildings that were added to the inventory between 2020 and 2021, based on the Facilities Inclusion Criteria (outlined below), a third building, the Conrad Centre for the Performing Arts, was also added based on the criteria, however it was not owned by the City in 2016 and therefore not included in the baseline adjustment. The remaining sixteen buildings were added to the inventory around 2019/2020, but it is unclear why they had not been included in previous years.

This now means that our GHG baseline is 12,3330 tCO<sub>2</sub>e, and thus our target absolute GHG emissions for 2026 is 11,343 tCO<sub>2</sub>e, as outlined in Table 5 below.

**Table 5 - Previous vs Adjusted Baseline and Target**

	<b>Previous (tCO<sub>2</sub>e)</b>	<b>Adjusted (tCO<sub>2</sub>e)</b>
2016 Emissions Baseline	10,191	11,514
2026 Absolute Emissions Target	9,376	10,593

### 3.2.2 Facilities Inclusion Criteria

On October 27<sup>th</sup>, 2022, CLT approved the inclusion criteria listed below. Based on these criteria and from this date onward, the City of Kitchener corporate GHG inventory includes facilities that meet these criteria.

**1. SFU scale rank – include facilities that rank SFU 3, 4 or 5**

The Supporting Functional Use (SFU) scale is used as a best practice in asset management to rate buildings critical to City operations. On this scale, facilities ranked 1 are low and those ranked 5 are the most critical to City operations and

**2. Ownership status – include facilities for which:**

- i. the City owns and operates the facility, or
- ii. the City owns the facility, and it is operated by another party, or
- iii. the City rents/leases from another party and

**3. Utility bill payment responsibility - include facilities where:**

- i. the City pays for utilities, or
- ii. the City has some cost recovery/sharing arrangement in place with the facility operator, or
- iii. there is direct payment of utility bills by the operator (no cost sharing)

#### 4 Appendix B – Summary of CorCAP 2.0: *Pivot Net-Zero* Actions by Division

**Please see Attachment B to the Council Report.**

## 5 Appendix C – Annual Progress Reporting

Staff intend to report progress on the following indicators yearly around Earth Day.

Type	Metric	Data Sources
Corporate	Total Annual Consumption by Energy Source (GJ)	Utility (Gas and Electricity) Bills provided by utility, Fuel consumption provided by Fleet Systems Specialist pulled from FLINT.
Corporate	Total Annual GHG Emissions by Energy Source (t CO <sub>2</sub> e)	Consumption data by energy source multiplied by applicable emission factor from verified source.
Corporate	Total Annual GHG Emissions by Corporate Focus Area (t CO <sub>2</sub> e)	Consumption data by focus area multiplied by applicable emission factor from verified source.
Corporate	Annual Renewable Energy Generated (kWh)	Metered by Enova
Corporate	% of Annual Energy Consumed from Fossil Fuels	Energy consumed (GJ) from fossil fuels (natural gas, fleet fuels, propane) divided by total energy consumed (GJ) x 100.
Corporate	Annual Total Utility Cost	Total cost of electricity, natural gas, propane, diesel, and gasoline for the assets included in GHG inventory.
Corporate	Corporate Spending on Carbon Pollution Pricing	Annual Fleet and Facilities GHG emissions (tonnes CO <sub>2</sub> e) x minimum national carbon price for reporting year ( <a href="#">Carbon Pollution Pricing</a> )
Corporate	Social Cost of Carbon	GHG emissions from all sources (tonnes CO <sub>2</sub> e) x Environment and Climate Change Canada's yearly estimate for social cost of carbon (\$/tonne) ( <a href="#">ECCC Social Cost of GHGs</a> )
Fleet & Equipment	Total Energy Use by Fuel Type	Fuel Quantities x applicable conversion factor (L x GJ/L)
Fleet & Equipment	GHG Per KM	Total Fleet GHGs / total KM driven (for on-road passenger vehicles)
Fleet & Equipment	% of fleet and equipment that are zero emissions	# of ZEV emission vehicles & equipment / total fleet assets (all categories)
Fleet & Equipment	% of Light-duty fleet that is zero-emissions	# of ZEV emission vehicles / Light-duty vehicles (cars, SUVs, Van & Chassis > 4,500 kg)
Fleet & Equipment	Annual Fuel Cost	Total annual cost of all fleet fuels (gasoline, ethanol 10, diesel, biodiesel blends, propane) – from Fleet Systems Specialist via Flint

Type	Metric	Data Sources
<b>Facilities</b>	Annual Utility Costs	Total cost of electricity, natural gas and propane associated with Facilities in GHG inventory via utility bills
<b>Facilities</b>	Energy Use by Facility	Utility consumption x applicable conversion factor (unit of energy x GJ/unit of energy)
<b>Facilities</b>	GHGs by Facility	-
<b>Facilities</b>	Energy use by Facility Type	-
<b>Facilities</b>	GHGs by Facility type	-