



GREEN FLEET STRATEGY

INTRODUCTION

Climate change is among the most pressing global challenges with wide-ranging impacts on ecosystems, economies and communities. The City of Vaughan has embraced a proactive approach to sustainability and is committed to fostering resilience and achieving net-zero emissions by 2050.

The City's Green Fleet Strategy, drawing guidance from such documents as Green Directions Vaughan and the 2022-2026 Term of Council Service Excellence Strategic Plan, exemplifies this commitment. The corporate fleet is the City's second largest source of corporate greenhouse gas emissions and this strategy provides a path to a green fleet through the integration of innovative technologies and energy-efficient practices.



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MESSAGE FROM THE MAYOR



Vaughan takes pride in being a green city, which is why I am pleased to introduce the City of Vaughan's new Green Fleet Strategy. This strategy expands on our vision of building a city that is cleaner and greener by transforming the way the City manages its fleet of vehicles.

We all have a responsibility to take care of our planet – and that starts at the government level. Through this strategy, we will invest in infrastructure that promotes environmental sustainability, adopts innovative technologies and transitions our fleet to low-emission alternatives.

Thank you to the dedicated City staff who have spent many hours putting together this innovative strategy.

While there is always more work to be done, the Green Fleet Strategy marks a significant milestone, demonstrating our commitment to building an environmentally conscious, world-class city for residents and visitors of generations to come.

A handwritten signature in black ink, appearing to read 'S. Del Duca'.

Steven Del Duca
Mayor, City of Vaughan

MESSAGE FROM THE CITY MANAGER



It's our responsibility, as the City of Vaughan, to keep up with the newest technologies and innovations to ensure we stay green, clean and efficient. That's where the new Green Fleet Strategy comes in. Providing our staff with eco-friendly alternatives, such as our green fleet of vehicles, allows them to continue delivering Service Excellence to our residents while protecting the planet.

Through innovative technologies and environmentally sustainable practices, the City is transforming how our fleet operates. We will make responsible investments to leverage smart solutions that support a greener future for Vaughan, such as building electric vehicle charging infrastructure and transitioning our fleet to low- and zero-emission vehicles.

Thank you to the Public Works portfolio for helping shape an even more sustainable future for our city.

A handwritten signature in black ink, appearing to read 'Zoran Postic', written over a faint circular stamp.

Zoran Postic
City Manager

MESSAGE FROM THE DEPUTY CITY MANAGER



The City of Vaughan's Green Fleet Strategy is a key component in our efforts to reduce greenhouse gas emissions while ensuring the City's fleet remains efficient, modern and financially sustainable.

Guided by Green Directions Vaughan and the 2022-2026 Term of Council Service Excellence Strategic Plan, we have thoughtfully considered innovative technologies, energy-conscious practices and evidence-based decision-making to ensure Vaughan continues to be a leader in environmental sustainability. Through fleet modernization, electric vehicle charging infrastructure development and governance-driven procurement, the future for a sustainable City fleet is bright.

I would like to extend my appreciation to the Transportation and Fleet Management Services department in Public Works as we drive this initiative forward to support continued Service Excellence for years to come.

Emilie Alderman
Deputy City Manager, Public Works



EXECUTIVE SUMMARY





STRATEGIC VISION

The City's Green Fleet Strategy sets a bold vision for a sustainable Vaughan, anchored by an efficient, low-emission and financially sustainable corporate fleet. Through the adoption of innovative technologies and the implementation of sustainable practices, the aim is to be at the forefront of environmental stewardship, nurturing a resilient, green community for current and future generations.

STRATEGIC OBJECTIVES



REDUCTION IN GREENHOUSE GAS:

Reduce fleet-related greenhouse gas emissions by 26 per cent by 2036, using the average fuel consumption from 2021 through 2023 as a baseline. This will be achieved by investing in infrastructure to support the green fleet transition and by ensuring that 100 per cent of eligible City-owned vehicles are transitioned to green alternatives within their planned replacement cycles.



RESILIENCE: Achieve net-zero emissions across the entire fleet by 2050 through the adoption of emerging technologies.

STRATEGIC PILLARS

1. Fleet modernization
2. Electric vehicle charging infrastructure and green energy readiness
3. Fleet efficiency and performance optimization
4. Governance-driven policy and procurement
5. Innovation, partnerships and engagement

GREENHOUSE GAS EMISSION OBJECTIVES



26%

below
2021-2023
average by
2036

Net-zero
by 2050



100%

of eligible vehicles transitioned
within planned replacement cycles



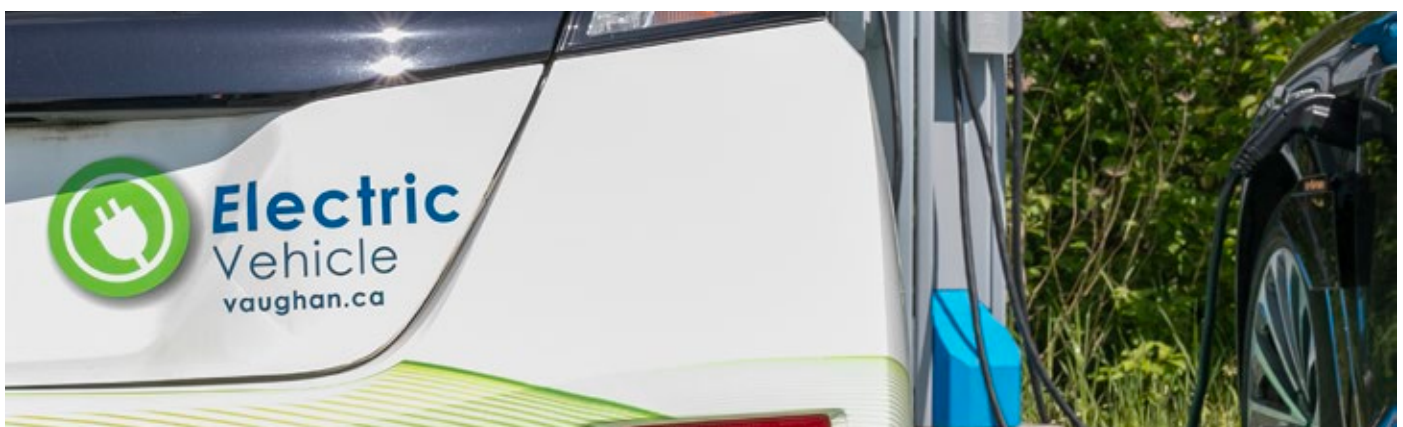
1/ BACKGROUND

FEDERAL NET-ZERO MANDATE AND MUNICIPAL BEST PRACTICES

Canada's federal net-zero mandate, established through the Canadian Net-Zero Emissions Accountability Act, commits to achieving net-zero greenhouse gas emissions by 2050. It sets five-year emissions reduction targets, starting with a 40 to 45 per cent reduction below 2005 levels by 2030. The mandate emphasizes transparency, accountability and public engagement, supported by science-based emissions reduction plans and sector-specific strategies. The Canadian mandate was influenced by the International Organization for Standardization's (ISO) Net

Zero Guidelines (IWA 42:2022), which provide a global framework with guiding principles, actionable steps and transparent reporting to help organizations, cities and countries achieve net-zero greenhouse gas emissions by 2050.

Municipalities across Canada are transitioning to low-emission fleets and investing in energy-efficient infrastructure to support sustainable operations. The City is actively involved in this transition and aims to reduce greenhouse gas emissions and achieve net-zero emissions by 2050.



The City is advancing its sustainability initiatives by transitioning its corporate fleet toward greener alternatives, aligning local efforts with intergovernmental climate action frameworks. This shift requires an evaluation of both internal combustion engine vehicles and battery electric vehicles, considering their infrastructure needs, benefits and the carbon emissions associated with their lifecycle. Internal combustion engine vehicles are characterized by higher operational carbon emissions due to fuel combustion, whereas battery electric vehicles significantly reduce operational emissions. However, the embodied carbon footprint of battery electric vehicles – derived from raw material extraction, battery production and manufacturing – can initially be higher than that of internal combustion engine vehicles. To address this, Vaughan is adopting a lifecycle-based decision-making approach, ensuring that both embodied and operational emissions are factored into procurement choices.



Beyond emissions, the transition to battery electric vehicles presents community and municipal advantages. Reduced greenhouse gas emissions and improved air quality contribute to a healthier urban environment, reinforcing Vaughan's leadership in sustainability. Additionally, battery electric vehicles offer operational benefits such as lower maintenance requirements and enhanced efficiency, supporting a more resilient and cost-effective corporate fleet. By integrating carbon considerations into fleet decision-making, Vaughan is working toward local climate targets while supporting broader provincial and national sustainability efforts.



ALIGNMENT WITH THE CITY'S STRATEGIC PLANS

The Green Fleet Strategy has been informed by a series of foundational documents that emphasize sustainability, innovation and environmental stewardship.

2022-2026 TERM OF COUNCIL SERVICE EXCELLENCE

STRATEGIC PLAN: This plan outlines Vaughan's vision, mission and values, focusing on seven strategic priority areas, including environmental sustainability. It emphasizes advancing stewardship of green infrastructure and investing in climate change mitigation. The Green Fleet Strategy aligns with these priorities by promoting sustainable practices and reducing environmental impact.

GREEN DIRECTIONS VAUGHAN 2019 COMMUNITY

SUSTAINABILITY PLAN: This plan serves as Vaughan's long-term sustainability framework, addressing environmental, cultural, social and economic values. It includes actions for green infrastructure and climate change resilience, directly supporting the Green Fleet Strategy.

SMART CITY TASK FORCE FINDINGS AND RECOMMENDATIONS

REPORT: This report highlights Vaughan's commitment to innovation and Smart City solutions, including data-driven approaches to infrastructure and sustainability. The findings support the Green Fleet Strategy by advocating for technology adoption that enhances fleet efficiency and reduces emissions.

CITY OF VAUGHAN CORPORATE ENERGY MANAGEMENT PLAN

2019-2024: This plan focuses on energy conservation and greenhouse gas reduction targets. It includes measures like retrofits and renewable energy adoption. The Green Fleet Strategy's objective of reducing fleet emissions is in alignment with the Corporate Energy Management Plan.

CITY OF VAUGHAN'S 2024 MUNICIPAL ENERGY PLAN: This plan serves as a strategic planning document and action framework that outlines how a community can increase energy efficiency, reduce greenhouse gas emissions and limit economic risks associated with transitioning to a low-carbon community.



CURRENT FLEET PROFILE

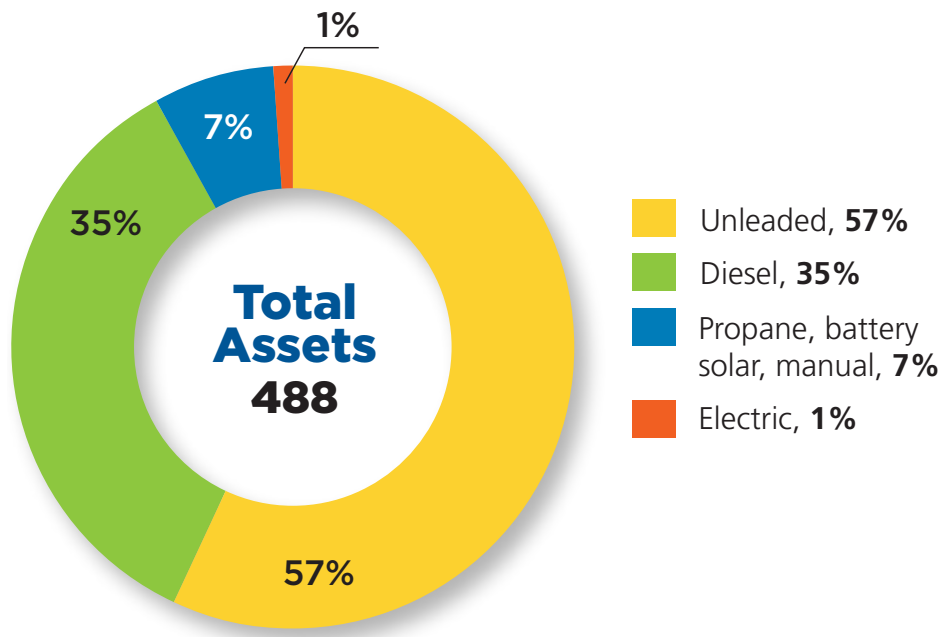
Vaughan’s corporate fleet is a critical enabler in fulfilling the City’s commitment to Service Excellence. The fleet team manages 488 motorized assets, including light duty trucks such as pickups, SUVs, vans, sedans, medium duty trucks, including larger pickups, heavy-duty trucks such as plow trucks and equipment such as heavy-duty construction and earth-moving equipment. The fleet motorized asset classification, count and eligibility for transition to battery electric vehicles are shown in Table 1. Eligibility criteria include market availability of battery electric alternatives and the ability of the battery electric alternative to meet service level requirements. The Vaughan Fire and Rescue Service (VFRS) fleet is not included.

TABLE 1: Fleet classification, count and eligibility for transition to battery electric vehicles

FLEET ASSET CLASSIFICATION	COUNT	ELIGIBLE FOR TRANSITION TO BATTERY ELECTRIC VEHICLE
Light duty truck	183	72
SUV	45	34
Van	42	29
Sedan	3	2
Medium duty truck	28	-
Heavy duty truck	8	-
Motorcycles	3	-
Equipment, other	176	-
TOTAL	488	137

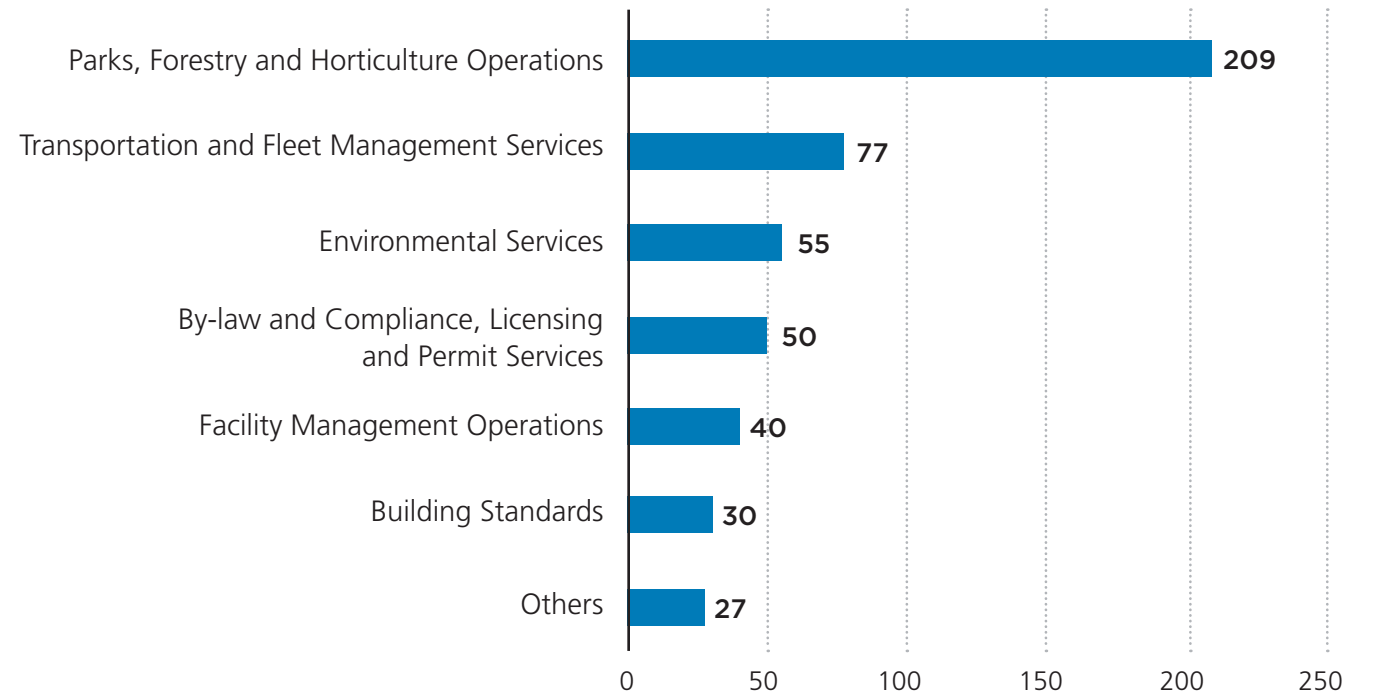
The City’s fleet is powered by a variety of fuel types, including diesel, electric, gasoline, propane and battery. Figure 1 shows the count of fleet assets by fuel type.

FIGURE 1: Fleet assets by fuel type



Many City departments use fleet assets to deliver services to residents. Figure 2 shows the fleet asset count by department.

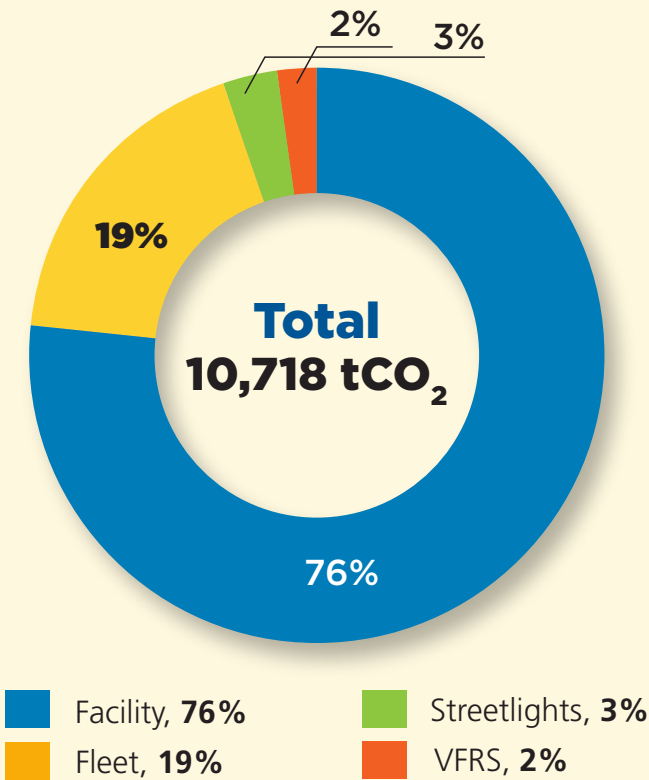
FIGURE 2: Count of fleet assets by assigned department



GREENHOUSE GAS EMISSIONS BASELINE

Vaughan’s corporate fleet was the second largest source of the City’s corporate greenhouse gas emissions in 2024 with emissions of 2,038 tonnes, which accounted for 19 per cent of all corporate greenhouse gas emissions. To address the need for reduction of these emissions, the City has set a target to reduce fleet emissions by 26 per cent, reaching 1,484 tonnes by 2036. This ambitious goal aligns with Vaughan’s sustainability plans and reinforces its commitment to creating a greener, more resilient future. Figure 3 shows emissions from City-owned facilities, the corporate fleet, VFERS and the City’s streetlight network.

FIGURE 3: City-wide greenhouse gas emissions sources



Corporate fleet greenhouse gas annual emissions have risen from 1,684 tCO₂ in 2019 to 2,038 tCO₂ in 2024, representing an overall increase of 21 per cent. The fleet emission baseline for this strategy is 2,013 tCO₂, which is the average amount of annual emissions from 2021 through 2023. Annual greenhouse gas emissions from the corporate fleet over the past six years are shown in Figure 4 and exclude greenhouse gas emissions from the VFRS fleet.

FIGURE 4: Annual greenhouse gas emissions from corporate fleet (tCO₂)

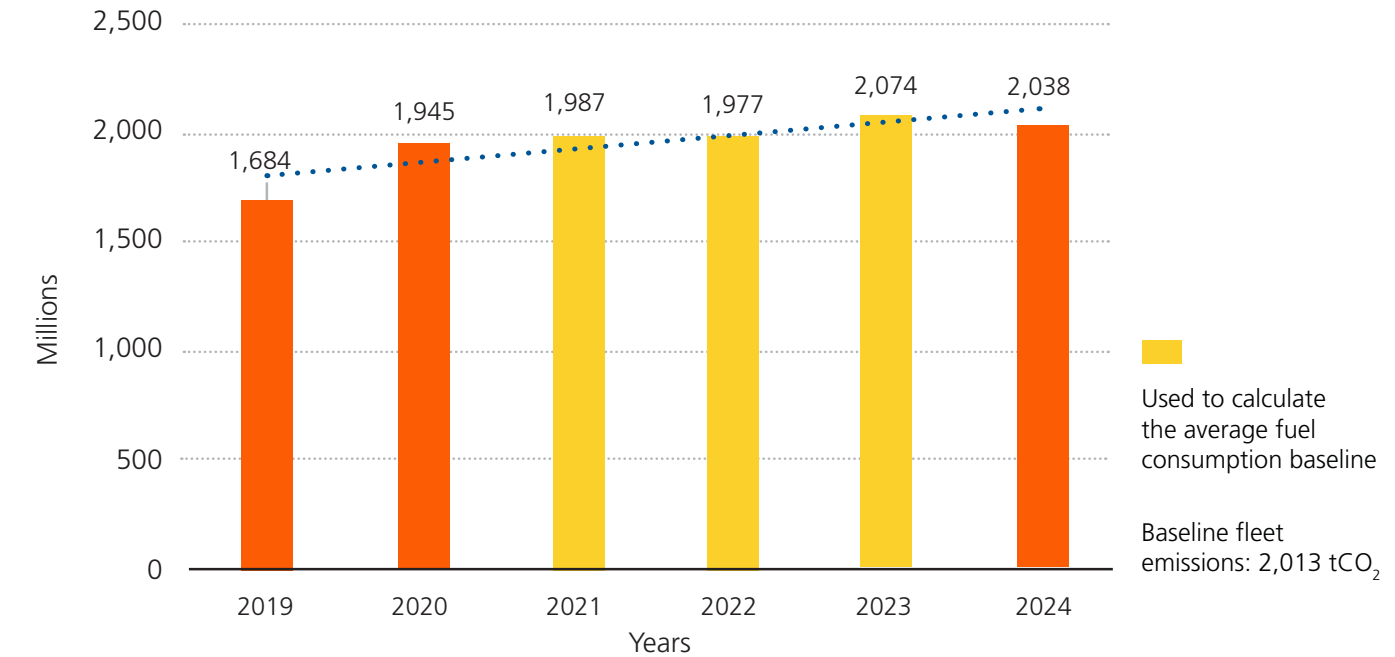
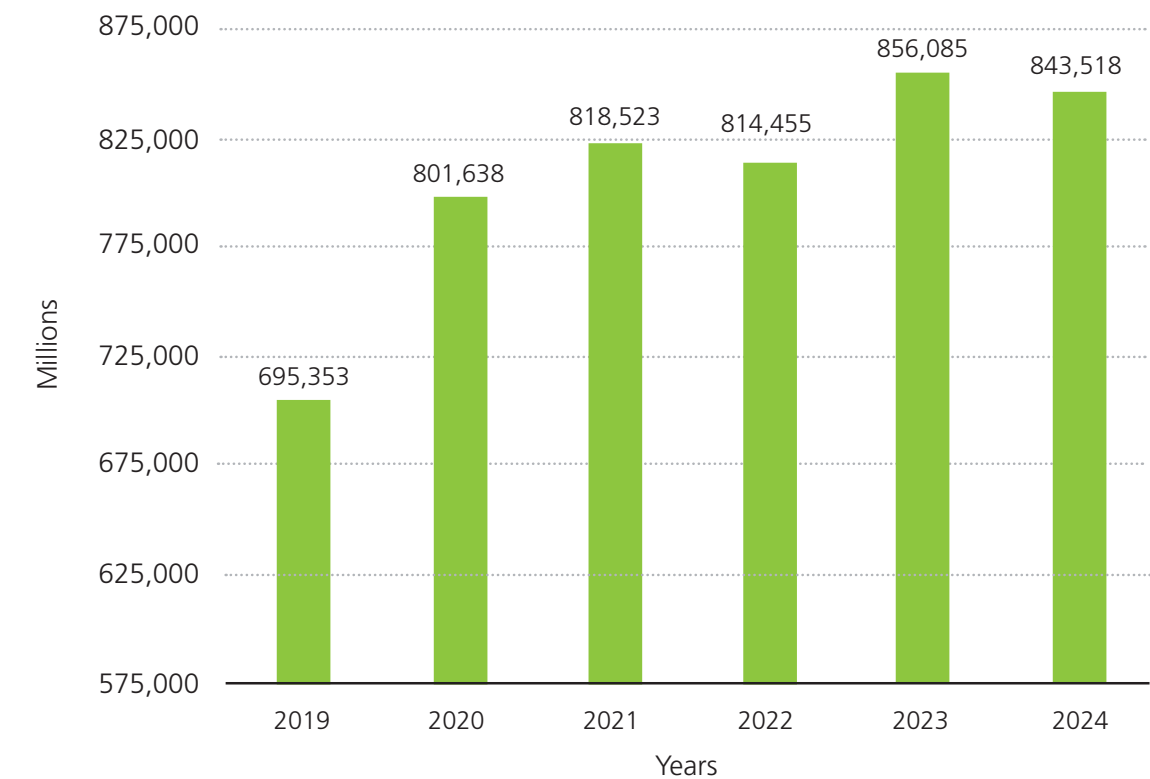


Figure 5 shows annual fuel consumption over the same period, which also shows a 21 per cent increase. VFRS fuel consumption is not included.

FIGURE 5: Annual fuel consumption (L)



IMPLEMENTATION PLAN





GREEN FLEET STRATEGY ROADMAP



Fleet modernization

Develop a fleet transition plan



Charging infrastructure and green energy readiness

Construct green infrastructure to support fleet transition

1

2025



Conduct fleet inventory and categorize assets



Prioritize retirement of the oldest vehicles and equipment and create a replacement plan

2026



Create a green vehicle 10-year transition plan

2

2025



Identify infrastructure requirements at various City locations



Assess the opportunity to install battery electric vehicle chargers at non-yard City sites



Establish a phased, roll-out for infrastructure to support battery vehicle implementation

2027



Conduct a Green Infrastructure Feasibility Study for City locations, leveraging the fleet transition plan



Install infrastructure at priority City locations





Fleet efficiency and performance optimization

Implement policies and initiatives to support a sustainable green fleet



Governance-driven policy and procurement

Implement sustainable financial and procurement practices to support long-term planning



Innovation, partnerships, and engagement

Leverage partnerships and alternative funding sources to fully explore emerging green technologies

3

4

5

2025



Educate drivers on the anti-idling policy for all fleet users

2026



Develop a driver scorecard/dashboard to include a baseline for idling and fuel efficiency



Communicate driver scorecard/dashboard monthly



Explore vehicle sharing opportunities



Implement annual green fleet training



Analyze predetermined routes to minimize fuel consumption

2027



Use service delivery analysis to inform vehicle usage and right-sizing

2025



Assess sustainable long-term funding mechanisms including the evaluation of capital leasing

2026



Develop a sustainability procurement plan to include green fleet requirements where operationally feasible

2025



Enhance engagement with other municipalities, utilities and government agencies

2026



Identify new funding opportunities



Consider intermunicipal and intergovernmental partnerships for costsharing opportunities

2027



Pilot emerging technologies that meet the City's sustainability needs



THE FRAMEWORK

The implementation plan provides a framework to transition Vaughan's corporate fleet toward sustainability, emphasizing modernization, infrastructure development, efficiency improvements, governance-driven policies and innovative partnerships. Through structured actions, measurable outcomes and stakeholder collaboration, this plan ensures a strategic and cost-effective approach to reducing emissions while optimizing operational performance. By integrating green technologies, refining fleet management practices and reinforcing long-term policy commitments, Vaughan is setting the stage for a more sustainable and efficient future. The series of actions identified in the plan will be implemented over the course of a 10-year period. The timeline, cost and status characterizations used in the action plans are summarized below in Table 2. More detailed financial information can be found in the financial framework section.

TABLE 2: Timeline, cost and status

TIMELINE	COST		STATUS	
Short-term: 1-3 years	N/A	Covered by existing staff and operating budgets	Not initiated	Pending budget approval
Medium-term: 4-7 years	\$	Under \$100,000	Planned	Part of current or future budgets
Long-term: Over 7 years	\$\$	\$100,000-\$500,000	Underway	Actions are initiated and are funded
Recurring	\$\$\$	Over \$500,000	Complete	



2 / STRATEGIC PILLARS



PILLAR 1: FLEET MODERNIZATION

Vaughan's corporate fleet will be transformed through the integration of low and zero-emission vehicles, setting the stage for long-term operational resilience, technological innovation and enhanced Service Excellence. Corporate fleet emissions average 2,013 tonnes of CO₂ annually, which represent 19 per cent of the City's total emissions. This pillar targets a 26 per cent emissions reduction by 2036, driven primarily by the electrification of light-duty vehicles or where market-ready solutions and operational compatibility are strongest.

The City will implement a 10-year transition plan that evaluates each asset's age, emissions profile and lifecycle stage to guide vehicle replacement with low- or zero-emission alternatives. Costs for the development of the transition plan are expected to be low,

with the exception of the capital costs for the fleet modernization which are expected to be higher due to the investment in infrastructure. Progress will be measured by the percentage of fleet transitioned annually and adherence to the transition model.

STAKEHOLDERS

The following stakeholders have been identified to support the implementation of fleet modernization actions:

- Transportation and Fleet Management Services
- Financial Planning and Development Finance
- Procurement Services
- Economic Development



ACTION ITEM 1: Develop a fleet transition plan

Timeline: 2025-2036

IMPLEMENTATION MECHANISM	TRACKING METRIC	TIMELINE	ESTIMATED COST	STATUS
1.1 Conduct fleet inventory and categorize assets by age, emission and lifecycle stage	Per cent completion of inventory	Short-term	\$	Complete
1.2 Prioritize retirement of the oldest vehicles and equipment and create a replacement plan for "greenest" option available that meets business needs	Per cent completion of plan	Short-term	\$	Complete
1.3 Create a green vehicle 10-year transition plan	Per cent completion of plan	Short-term	\$	Complete
1.4 Complete implementation of 10-year fleet transition plan	Per cent of vehicles transitioned according to fleet transition plan	Long-term	\$\$\$	Planned (through 2036)



PILLAR 2: BATTERY ELECTRIC VEHICLE CHARGING INFRASTRUCTURE AND GREEN ENERGY READINESS

To enable a successful fleet transition, the City will ensure internal readiness through the deployment of battery electric vehicle charging infrastructure and alignment with long-term energy strategies. This pillar supports the integration of electric vehicles by installing chargers at City facilities including operational yards, fleet bays and various City sites and preparing for renewable energy use over time.

The phased rollout through 2036 includes feasibility assessments, capital deployment and strategic scheduling aligned with vehicle conversion timelines. Costs are expected to be medium-scale and primarily infrastructure-related, requiring co-ordinated investment across multiple facilities. Milestones will be monitored through the number of chargers deployed, percentage of equipped locations and infrastructure readiness by site. This pillar secures Vaughan's ability to operate a green fleet at scale while enhancing energy resilience and future adaptability.

STAKEHOLDERS

The following stakeholders have been identified to support the implementation of battery electric vehicle charging infrastructure and green energy readiness actions:

- Transportation and Fleet Management Services
- Facility Management Operations
- Infrastructure Delivery
- Financial Planning and Development Finance
- Procurement Services
- Economic Development





ACTION ITEM 2: Construct green infrastructure to support fleet transition

Timeline: 2025-2036

IMPLEMENTATION MECHANISM	TRACKING METRIC	TIMELINE	ESTIMATED COST	STATUS
2.1 Identify infrastructure requirements at various City locations	Per cent of locations reviewed	Short-term	\$	Complete
2.2 Assess the opportunity to install battery electric vehicle chargers at City non-yard locations	Per cent completion of assessment	Short-term	\$	Underway
2.3 Establish a phased roll-out for infrastructure to support battery electric vehicle implementation leveraging the fleet transition plan	Per cent completion of roll-out plan	Short-term	\$	Complete
2.4 Conduct a Green Infrastructure Feasibility Study for City locations leveraging the fleet transition plan	Per cent of locations completed	Short-term	\$\$	Planned 2027-2028
2.5 Installation of infrastructure at priority City locations	Per cent of charging stations deployed according to plan	Medium-term	\$\$\$	Planned 2027-2033



PILLAR 3: FLEET EFFICIENCY AND PERFORMANCE OPTIMIZATION

Improving how fleet assets are used is essential to maximizing environmental benefits and operational value. This pillar focuses on embedding efficiency into day-to-day operations through technologies and practices that reduce fuel consumption, eliminate waste and strengthen accountability.

Key initiatives include rollout of anti-idling enforcement, route optimization, vehicle rightsizing, telematics integration and hands-on training for staff. Costs are expected to be low as these efforts will be delivered through internal resources and modest technology investments. Progress will be measured through reductions in idling hours, fuel use and greenhouse gas emissions per asset, along with driver scorecard results and training participation. By embedding sustainability into operations, this pillar drives measurable gains in fleet productivity and climate performance.

STAKEHOLDERS

The following stakeholders have been identified to support the implementation of fleet efficiency and performance optimization actions:

- Transportation and Fleet Management Services
- Communications, Marketing and Engagement
- Policy Planning and Special Programs
- Procurement Services
- Economic Development



ACTION ITEM 3: Implement policies and initiatives to support a sustainable green fleet

Timeline: 2025-2031

IMPLEMENTATION MECHANISM	TRACKING METRIC	TIMELINE	ESTIMATED COST	STATUS
3.1 Educate drivers on the anti-idling policy for all fleet users	Per cent of users trained	Recurring	N/A	Planned 2025
3.2 Develop a driver scorecard/dashboard to include a baseline for idling and fuel efficiency by vehicle category and reminders	Per cent completion of scorecard	Short-term	N/A	Planned 2025-2026
3.3 Communicate driver scorecard/dashboard monthly	Monthly communication of scorecard	Recurring	N/A	Planned 2026
3.4 Use service delivery analysis to inform vehicle usage and right-sizing	N/A	Recurring	N/A	Planned 2027
3.5 Explore vehicle sharing opportunities for travel between City locations	N/A	Short-term	N/A	Planned 2026
3.6 Analyze predetermined routes to minimize fuel consumption	Per cent of routes analyzed	Short-term	\$	Planned 2026-2028
3.7 Implement annual green fleet training for technicians and users	Per cent of fleet staff and users trained	Short-term	\$	Planned 2026





PILLAR 4: GOVERNANCE-DRIVEN POLICY AND PROCUREMENT

Long-term sustainability requires a formal integration of green objectives into the City's decision-making systems. This pillar establishes governance, policy and procurement mechanisms that ensure every fleet investment is fiscally responsible and aligned with climate commitments.

Environmental considerations will be embedded into capital planning, purchasing criteria and lifecycle budgeting. Actions include the development of a green fleet procurement framework and exploration of alternative financing mechanisms such as capital leasing. Costs are expected to be low to moderate. Success will be tracked through the adoption of new procurement guidelines, use of sustainability criteria in vehicle acquisition, and alignment of funding mechanisms with long-term emissions targets. This pillar reinforces institutional discipline and ensures accountability across all fleet decisions.

STAKEHOLDERS

The following stakeholders have been identified to support the implementation of governance-driven policy and procurement actions:

- Transportation and Fleet Management Services
- Financial Planning and Development Finance
- Procurement Services
- Policy Planning and Special Programs

ACTION ITEM 4: Implement sustainable financial and procurement practices to support long-term planning

Timeline: 2025-2031

IMPLEMENTATION MECHANISM	TRACKING METRIC	TIMELINE	ESTIMATED COST	STATUS
4.1 Develop a sustainability procurement plan to include green fleet requirements where operationally feasible	Approval of Social Procurement Policy	Short-term	N/A	Planned 2026-2027
4.2 Secure sustainable long-term funding mechanisms including the evaluation of capital leasing	Annual budget adoption	Recurring	N/A	Underway



PILLAR 5: INNOVATION, PARTNERSHIPS AND ENGAGEMENT

Achieving net-zero fleet operations will require both internal readiness and external collaboration and adaptive learning. This pillar accelerates the adoption of emerging technologies, deepens strategic partnerships and builds staff capacity to operate in a green fleet environment.

This pillar includes pilot testing of new technologies, cross-jurisdictional knowledge sharing and proactive pursuit of grant and cost-sharing opportunities. Financial costs are relatively low and are expected to be offset by external funding. Key metrics include the number of pilot projects completed, partnerships established and new funding streams secured. By embedding a culture of innovation and collaboration, Vaughan positions itself as a leader in corporate fleet transformation and environmental stewardship.

STAKEHOLDERS

The following stakeholders have been identified to support the implementation of innovations, partnerships and engagement actions:

- Transportation and Fleet Management Services
- Procurement Services
- Economic Development
- Communications, Marketing and Engagement
- Policy Planning and Special Programs



ACTION ITEM 5: Leverage partnerships and alternative funding sources to fully explore emerging green technologies

Timeline: 2025-2036

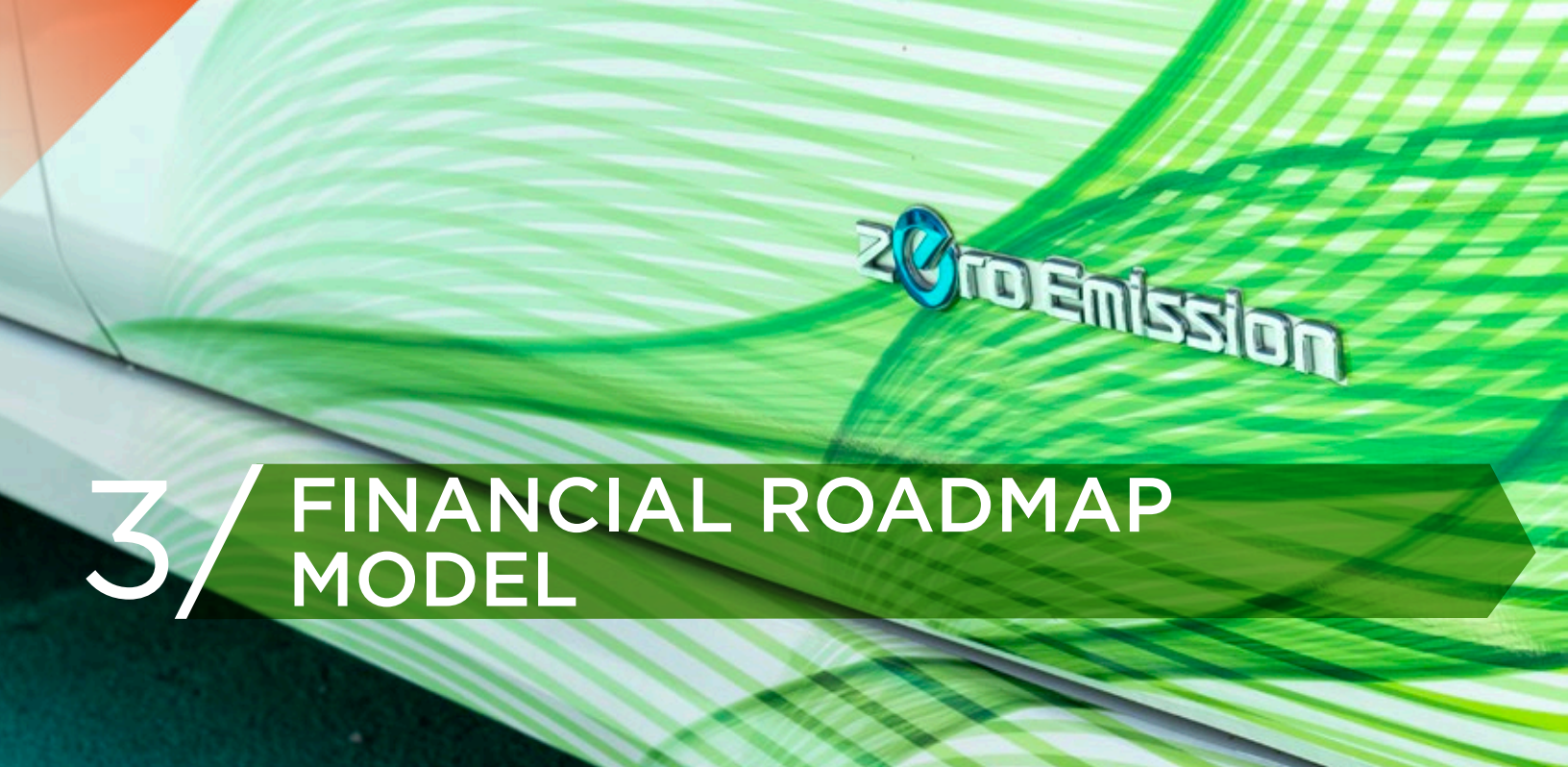
IMPLEMENTATION MECHANISM		TRACKING METRIC	TIMELINE	ESTIMATED COST	STATUS
5.1	Enhance engagement with other municipalities, utilities, government agencies and the private sector to evaluate alternative fuels and green fleet technology opportunities	Number of partnerships established	Short-term	\$	Underway
5.2	Explore intermunicipal and intergovernmental partnerships for cost-sharing opportunities	Number of cost-sharing agreements	Short-term	\$	Planned 2026-2027
5.3	Identify new funding opportunities	Number of alternative funding sources secured	Recurring	N/A	Underway
5.4	Pilot emerging technologies that meet the City's sustainability needs	Number of pilot projects completed	Recurring	\$\$	Planned 2027
	Explore opportunities with the private sector to explore new technologies	Number of pilot projects completed	Recurring	N/A	Planned 2026

FINANCIAL FRAMEWORK





The green fleet transition is planned for implementation over a 10-year timeline. Both capital and operating funding will be required to support the strategy. Funding will be requested through the City's long-range financial planning process, annual budget process, grants and alternative funding where available.



Zero Emission

3/ FINANCIAL ROADMAP MODEL

Capital expenditures will be required for the procurement of electrical vehicles and to install the infrastructure required to support the green fleet's charging and growth needs. Operating expenditures for the green fleet will include vehicle maintenance and electricity charges. These electric vehicle and infrastructure expenditures will be compared to an equivalent group of vehicles powered by conventional gasoline engines. This status quo group consists of both internal combustion engine and hybrid vehicles.

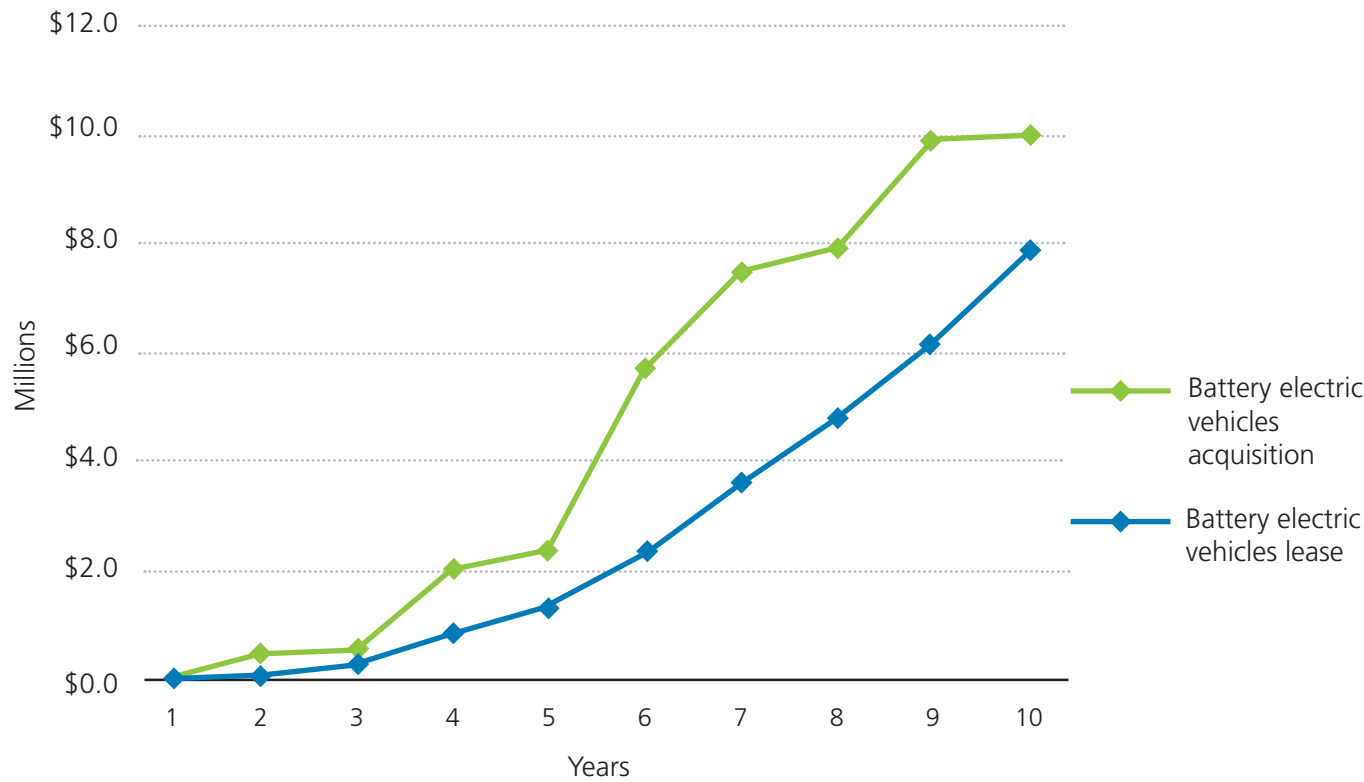
BATTERY ELECTRIC VEHICLE CAPITAL REQUIREMENTS

A group of 137 vehicles has been identified as eligible for transition from either internal combustion engine or hybrid engines to battery electric vehicle. The selection criteria include market availability of battery electric vehicles and the ability of the vehicle to meet service level requirements of the internal combustion engine or hybrid vehicle that will be replaced. The vehicle types within this group include SUVs, vans and light duty pickup trucks.

The City has two options to obtain battery electric vehicles: they can be procured outright, which is the current City practice,

or the vehicles can be leased. The benefits of leasing include the smoothing of cash flows in comparison to purchase, vehicles utilizing more recent technology for lower fuel consumption and lower maintenance expenses characteristic of newer vehicles. The analysis demonstrates that the lease option is expected to be the more cost-effective capital option by approximately \$2 million over the 10-year timeframe. Based on these merits, the battery electric vehicle lease option is preferred at this time.

FIGURE 6: Capital costs of battery electric vehicles acquisition versus lease over 10-year timeframe



BATTERY ELECTRIC VEHICLE INFRASTRUCTURE CAPITAL COSTS

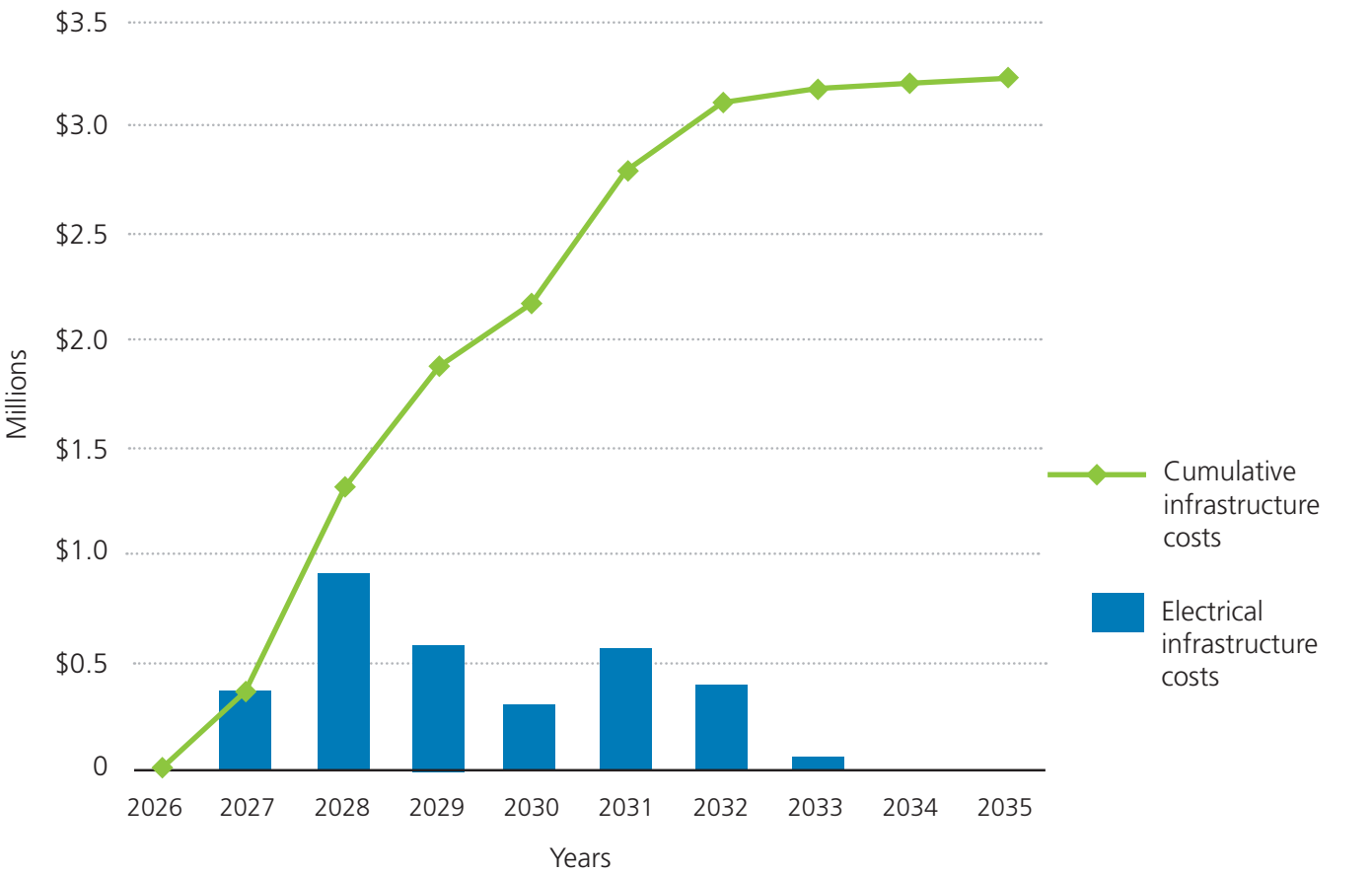
The transition to battery electric vehicles will require the installation of infrastructure to support charging. The costs include the installation of charging adaptors and the costs for trenching for cable installation and the repaving of surfaces. The infrastructure will be installed in phases to reduce annual funding pressure while meeting the needs of the green fleet as it grows. The infrastructure will be installed in phases to keep costs down while meeting the needs of the green fleet as it grows. The chart below shows the annualized and cumulative infrastructure costs of \$3.1 million over the 10-year transition period.

Charging stations will be installed in a phased rollout. The table below provides an overview of the current plan by location over the 10-year period.

TABLE 3: Charging station rollout plan

LOCATION	2026-2030	2031-2035	TOTAL
City Hall	17	19	36
City yards	48	25	73
Non-yard City sites	4	2	6
TOTAL	69	46	115

FIGURE 7: Electrical infrastructure costs



BATTERY ELECTRIC VEHICLE OPERATING COSTS

Operating costs for battery electric vehicles consist of vehicle maintenance and charging costs. These costs are much lower than the corresponding operating costs for the status quo group of internal combustion engine and hybrid vehicles. The Canadian Automobile Association cites the following cost comparisons between battery electric vehicles internal combustion engine vehicles:

- The average battery electric vehicle owner saves about 40 per cent to 50 per cent on maintenance costs compared to a gas-powered vehicle.
- Fueling a battery electric vehicle is only a few hundred dollars annually while an internal combustion engine vehicle may cost up to \$3,000 in fuel over the same timeframe.

Through the leasing approach, battery electric vehicles operate within the lowest cost portion of their lifecycles which is expected to provide additional savings. Figure 8 on the following page compares the battery electric vehicle operating costs for the 10-year transition period with those of the status quo group of internal combustion engine and hybrid vehicles. The operating costs for the status quo group are significantly higher than the battery electric vehicle equivalents.



FIGURE 8: Status quo versus battery electric vehicles annual operating costs over the 10-year period

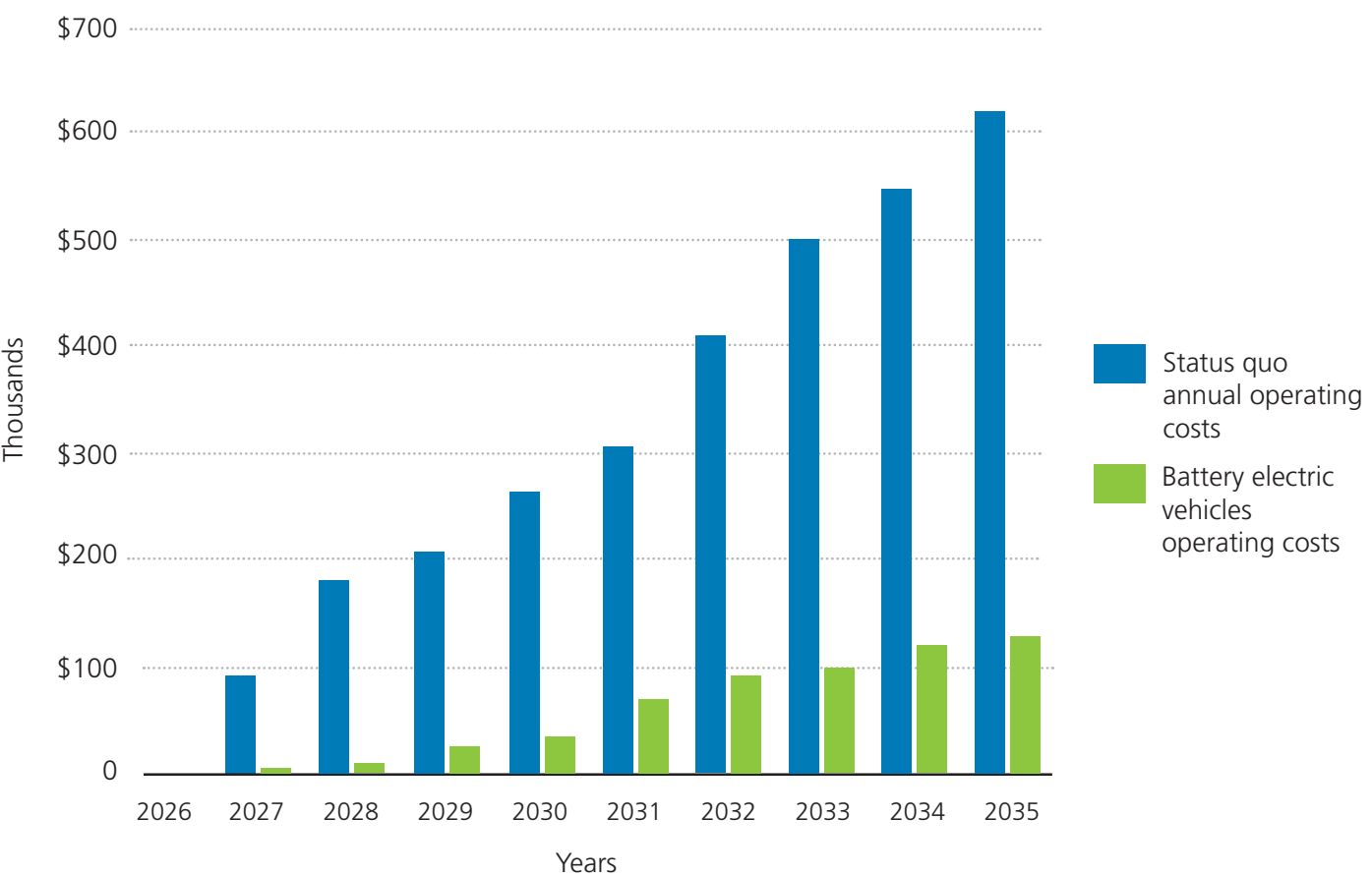


Figure 8 compares the battery electric vehicle operating costs with those of the current group of internal combustion engine and hybrid vehicles over the 10-year transition period. The operating cost savings of battery electric vehicles is approximately \$2.5 million.



FIGURE 9: Battery electric vehicles versus status quo cumulative operating costs over the 10-year period

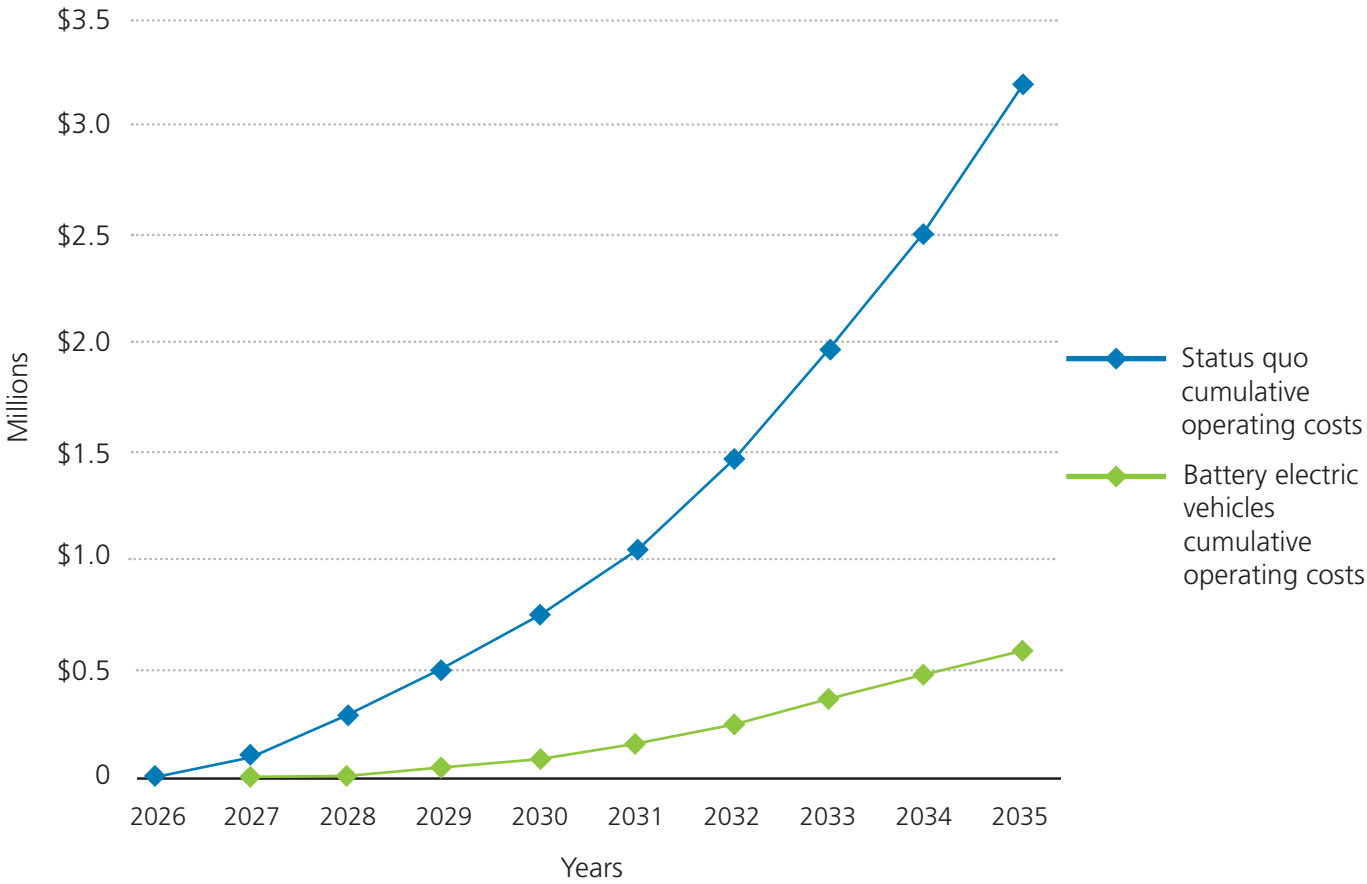


Figure 9 demonstrates the operating cost advantages of leased battery electric vehicles compared to a comparable set of internal combustion engine and hybrid vehicles.



COST OF IMPLEMENTATION COMPARISON

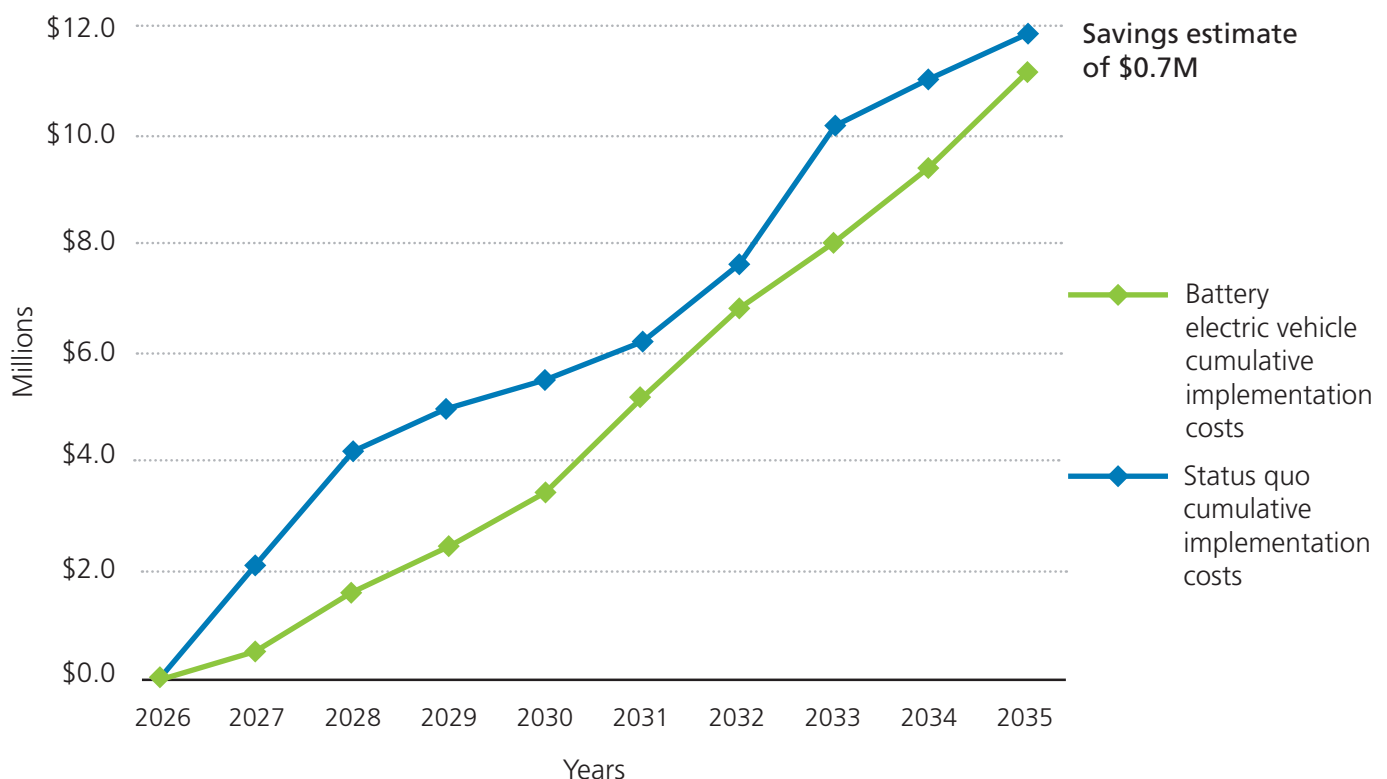
Battery electric vehicles are more cost-effective from an operating perspective compared to the conventional, internal combustion engine and hybrid vehicles. The latter, however, do not require additional infrastructure to operate as fuel locations are already in place and maintenance operations are geared towards the needs of internal combustion engine and hybrid technology. Figure 10 compares the total cost of implementation for battery electric vehicles to the status quo group of internal combustion engine and hybrid vehicles considering both capital and operating requirements.

Figure 10 demonstrates that the transition to battery electric vehicles can be more cost-effective than continuing with the status quo program of internal combustion

engine and hybrid vehicles even with the additional outlay of electrical infrastructure required to support the battery electric vehicle rollout. The transition to battery electric vehicles is estimated to save approximately \$0.7 million over the 10-year timeframe while still providing significant environmental benefits. Any funding from provincial or federal programs would make the transition financially favourable.

Stakeholder requirements and market conditions change over time. Future needs may be different from those of today and require periodic reviews to ensure the course that is plotted still meets the needs of all stakeholders. The City is committed to reviewing the proposed transition plan so that it meets stakeholders' needs beyond the 10-year period of the current plan.

FIGURE 10: Status quo versus battery electric vehicle cost of implementation



SENSITIVITY ANALYSIS

The battery electric vehicle market is affected by externalities that can impact the proposed transition plan. For instance, increases in battery electric vehicle pricing could make the program less cost-effective. A prolonged high-interest rate environment could negatively affect lease rates, with rising electricity costs further contributing to this impact through higher operating expenses.

These factors were examined to understand their impact on the financial feasibility of the proposed battery electric vehicle transition program.

The financial feasibility of the transition plan is most sensitive to vehicle price increases.

If battery electric vehicle prices rise by less than 10 per cent, the transition plan is still expected to deliver overall cost savings. Internal combustion engine and hybrid solutions would be more cost-effective solutions beyond this point unless they also experience similar increases. Interest and electricity rate increases would raise the cost of the transition but are not material. Alternative funding such as government grants is not included in this analysis, but would also reduce costs and decrease the sensitivity to price increases.

FUNDING OPPORTUNITIES

The Green Fleet Strategy will require capital funding for both vehicles and the infrastructure required to support vehicles. Strategy-related funding will be requested through the City’s annual budget process. Opportunities for external funding are available for zero emission

vehicles, their infrastructure and studies. Programs that are known to have provided funding are listed below. Funding from some sources is paused at present but may reopen in the future.

TABLE 4: Opportunities for external funding

SOURCE	FUNDING OPPORTUNITY
Government of Canada	• Zero Emission Vehicle Infrastructure Program: provides funding for the deployment of electric vehicle chargers and hydrogen refueling stations. • Incentives for Zero Emission Vehicles Program: provides point-of-sale incentives for eligible consumers (subject to funding availability) who buy or lease eligible zero emission vehicles.
Federation of Canadian Municipalities (FCM)	• FCM Green Municipal Fund Pilot Project: provides up to \$500,000 in funding to reduce fossil fuel use in corporate fleets.
Other	• Atmospheric Fund’s EV Station Fund: provides organizations with rebates of up to 50 per cent of electric vehicle charging station installation cost.

RISK MANAGEMENT AND DEPENDENCIES



A close-up photograph of a white vehicle, likely a bus or truck, showing the number '549' in large blue digits. The image is partially obscured by a blue header and a white sidebar.

4 / ONGOING CONSIDERATIONS

Vaughan's Green Fleet Strategy is a critical component in the City's goal to achieve the Net-Zero Greenhouse Gas emission target by 2050. There are certain dependencies that will need to be evaluated on an ongoing basis to assess their potential impact on achieving this goal.

- **Industry readiness:** the ability to procure green vehicles is dependent upon the automotive industry's readiness to produce viable vehicle options in the required quantities.
- **Technology:** The long-term transition to a greener fleet will be dependent upon the timely development of new technologies by the automotive industry, especially for medium- and heavy-duty vehicles.
- **Government regulations:** Federal and provincial regulations and mandates regarding zero emission vehicle sales are critical in ensuring that there is sufficient demand and availability of zero emission vehicle options.
- **Funding:** Third-party funding options, such as the federal government's Zero Emission Infrastructure and Vehicles programs, can play a key role in reducing upfront investment costs but may not be available on a full-time basis.

