City of Greater Sudbury Fleet Electrification Plan

August 2025

Introduction

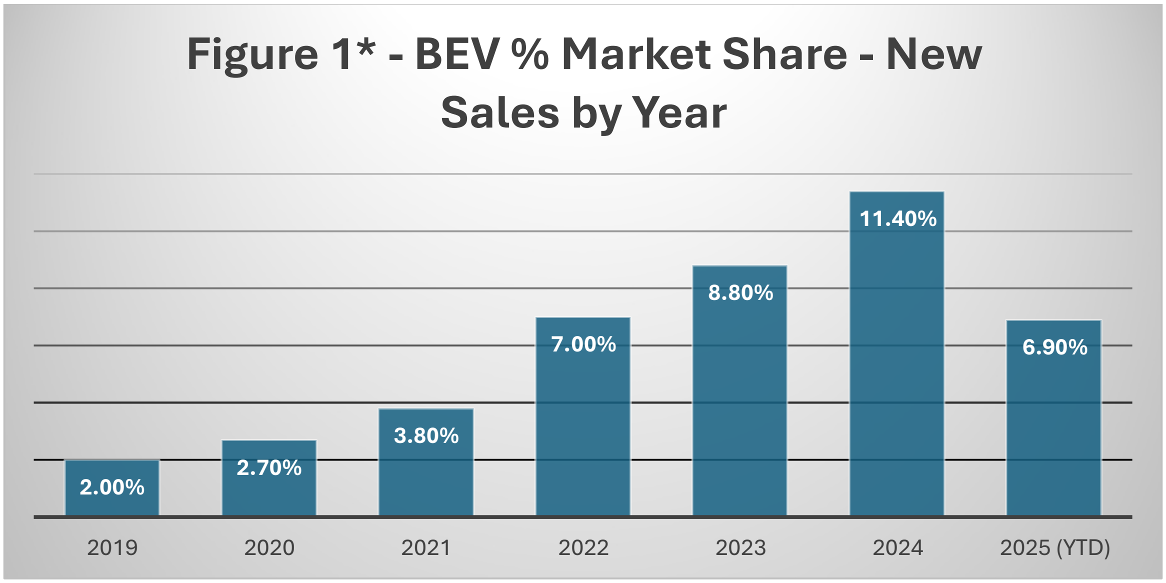
The transition to a low emission fleet requires infrastructure and new vehicle investments. It also encompasses the introduction of new processes and technology into operations. As a result, costs, vehicle operations, site conditions, alternatives and markets need to be considered in a low emission fleet conversion. This plan acts as a guide to transition the Greater Sudbury light duty fleet and ice resurfacing fleet to electric.

The City of Greater Sudbury's municipal fleet is a varied mix of assets. It includes light duty passenger vehicles, heavy equipment (loaders, graders, etc.), transit buses, emergency vehicles, specialty equipment (vactors, garbage packers, sweepers etc.), medium duty work trucks and heavy-duty vehicles. Many of these specialized and heavy-duty asset classes do not have commercially viable battery electric replacements available on the market today. While medium-duty vehicle alternatives are either still in the early prototype phases or are not yet considered by OEMs for electrification. These vehicle types often have extended duty cycles, operate in cold temperatures, and have permanent payload considerations due to box storage, cranes, and snowplows. The feasibility of electrifying the specialized, heavy and medium-duty fleet will be re-evaluated in the future as battery technology improves, the market matures, and new types of battery electric vehicles become available in these segments.

This plan proposes a scope that focuses electric vehicle implementation for the City's light duty and ice resurfacing fleet. Implementation is phased and based on the existing lifecycles of the current internal combustion engine fleet. Charging infrastructure would be staged and procured along with the delivery of electric vehicles. This will provide for maximum flexibility to adapt and adjust the plan as technology advances in both charging infrastructure and electric vehicles.

Industry Overview

In 2021, the Government of Canada announced that it is setting a mandatory target for all new light-duty cars and passenger trucks sales to be zero-emission by 2035, accelerating Canada's previous goal of 100 percent sales by 2040. Battery electric vehicles (BEVs) technology has seen significant progress and success in the last quarter-century. Implementation of BEV's in both the consumer, commercial and government has grown substantially in that time and particularly over the course of the last decade. Figure 1 Below displays the growth in BEV market share from 2019 through Q1 2025. Except for Q1 2025 there has been exponential growth in the adoption of BEV's nationally, increasing from 2% in 2019 to 11.4% in 2024.



* Source: Transport Canada

Technology

Due to their high energy density and long cycle life, the lithium-ion car battery has become the leader in electric car battery types. Lithium-ion batteries are made primarily of carbon and highly reactive lithium, which can store significant amounts of energy. This is the same technology utilized in computers and cell phones.

The electric battery in a BEV stores and outputs direct current (DC) power. The DC power gets converted into alternating current (AC) power by the vehicle's inverter, which powers the vehicle's electric motor by alternating between positive and negative charges and utilizing electromagnetics to ultimately rotate the vehicle's drive system and turn the wheels.

Utilizing lithium-ion has allowed for batteries to become increasingly dense, and in turn able to store higher amounts of energy. This has resulted in the vastly improved driving range of BEV's. Most BEVs now report ranges over 500 kilometres in a positive environment. Further improvements in battery chemistry and cell design could continue to increase range capabilities and providing for more commercially viable types of BEV's.

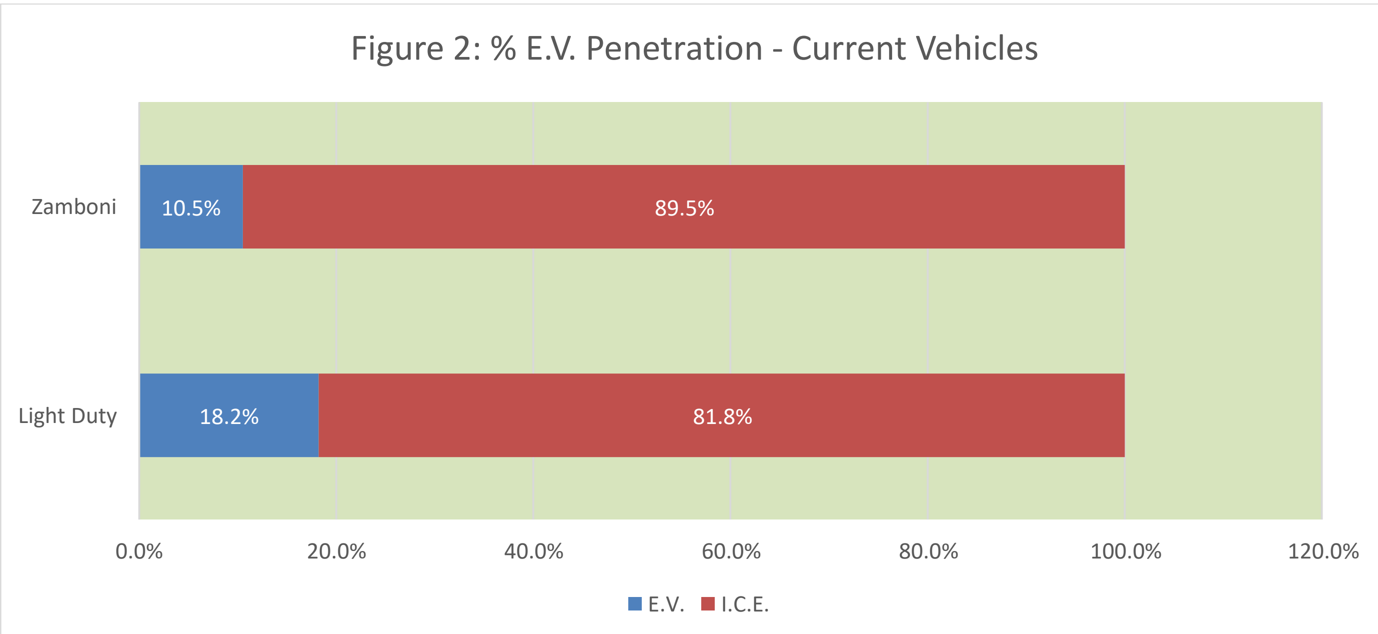
Current BEV Market

Many light duty vehicles have electric alternatives, but larger vehicles and those with more intense uses or working conditions are less likely to have a compatible electric alternative. This is due to the higher battery capacity to perform similar operations to that of a conventional diesel or gasoline vehicle. Due to the size, weight and cost of the vehicle battery, a viable electric alternative may not be feasible in today's market. Additionally, the extreme cold negatively impacts the battery's ability to store and use energy, which further limits the availability of electric alternatives.

Scope

The scope of this plan is limited to categories where electrification is currently a viable option. Categorically, this is represented by the light duty vehicles and ice resurfacing machines. Some emergency services (fire, paramedics) are not included due to the potential time demands and locations of the work. Replacement of ice resurfacing fleet does not consider the potential impact of the Valley East Twin- Pad on number of chargers and ice resurfacing equipment at current facilities. The plan is a one-for-one replacement and will be adjusted as future decisions and direction are finalized.

Figure 2 below outlines the current EV Penetration rate amongst light duty vehicles and ice resurfacing machines. As of Q3, 2025 the City has purchased and/or ordered 29 electric vehicles and 2 electric Zambonis. Including the units on order, the penetration rate for EVs is 18.2 % and10.5 % for light duty and ice resurfacing machines respectively.



The focus of this plan is the remaining 89.5% of ice resurfacing machines and the 81.8% of the light duty fleet that have not been converted to EVs.

Electric Vehicle Availability per Category

Electric vehicles selected for the various light duty categories and the quantities of each are identified in Figure 3 below. The electric alternatives in each category were selected based on their applicability to City operations and cost considerations. These vehicles represent the current light-duty and Zamboni fleet that are not electric and are being identified for electrification.

Figure 3: In Scope Vehicles and Electric Alternative

Vehicle Category	Quantity	Electric Alternative
1/2 Ton Pickup	71	F150 Lightning
Full Size Van	16	Ford E Transit
Minivan	15	Kia EV9
Sedan	7	Hyundai Kona
SUV	21	Chevrolet Equinox
Zamboni	16	Electric Zamboni

Estimates of daily usage in kilometres and hours were utilized to assist in selecting the appropriate vehicle that could operate in all seasons and still provide the required service level. Figure 4 below outlines these statistics.

Figure 4: Daily Usage by Vehicle Category

Category	Avg. Kilometers	Max. Kilometers	Avg. Hours	Max. Hours
Sedan	51	125	6	8
SUV	58	130	1	5
Minivan	70	125	5.5	7
Full-Size Van	75	125	7.5	11
½-Ton Pickup Truck	83	150	6.6	9

Sedans: Electric models available include the Nissan Leaf, Kia Soul EV, Hyundai Ioniq, Hyundai Kona, and Tesla Model 3. The Hyundai Kona was selected for modelling.

SUVs: Electric makes/models from Chevrolet, Ford, Honda, Hyundai, Kia, Nissan, Tesla, Toyota, and Volkswagen exist today. The Chevrolet Equinox EV was selected for modelling.

Minivans: The only electric minivan available is the Volkswagen ID Buzz released in 2025. Due to price and applicability concerns, a 3-row electric SUV (Kia EV9) is used in modelling.

Full-Size Vans: The fully electric Ford e-Transit was selected for modeling as it best represents existing vehicle requirements.

½-Ton Pickup Trucks: There are ½-ton electric trucks available, including the Ford F150 Lightning. The Ford F150 Lightning Pro was selected for modeling because this vehicle has a towing capacity of up to 4,535 kg which meets the operational requirements.

Charging Infrastructure Overview

There are three categories of electric vehicle charging stations available. They are outline in Figure 5 below. All three types vary in level of power output, charge speed, type of equipment and cost. The voltage and current provided to the electric vehicle's battery defines the level of charger and contributes to the charging speed and the cost. For all City fleet, level 2 chargers are considered sufficient and most cost effective.

Figure 5 – Tyes of Charging Stations and Relevant Attributes

	Level 1	Level 2	Level 3
Typical Output	1.5 kW (120 Volts)	7.2-20 kW (240 Volts)	50 kW – 350 kW (400 – 800 Volts)
Range Add Per Hour (Approximate)	8 km	50 km	300 km +
Equipment & Installation Costs	$500 - $1,500	$5,000 - $10,000	$120,000 - $200,000
Typical Use Locations	Homes, Workplaces	Homes, Workplaces, Public Spaces	Workplaces, Public Spaces

Charging Standards

The North American Charging Standard (NACS) is an electric vehicle (EV) charging connector standard developed by Tesla, designed to simplify and enhance the charging experience for EV users in North America.

In 2022, Tesla opened the standard to other manufacturers, and Society of Automotive Engineers International formally standardized it in 2023. NACS uses a single compact connector for both AC and DC charging, sharing common pins for both modes, unlike other systems that require different or larger connectors for DC fast charging.

Between May 2023 and February 2024, most major automakers announced plans to adopt NACS for their North American EVs beginning with the 2025 model year, replacing the Combined Charging System Combo 1 connector. This plan includes the procurement of NACS charging connectors.

Existing Charging Infrastructure

Charging infrastructure has been installed and/or ordered for various locations that currently have electric vehicles or will be receiving them in 2025. These comprise of 8 sites with charging infrastructure including the 2 arenas that house the electric Zambonis. Figure 6 below outlines the charging infrastructure dedicated to the City Fleet.

Figure 6: Charging Infrastructure by Location		
Charger location	**Charger Level**	**Number of Chargers**
Lionel Lalonde Centre	2	4
Tom Davies Square	2	4
Lorne Street Depot	2	4
St Clair Depot	2	2
Frobisher Depot 1900	2	2
Frobisher Depot 1800	2	4
Tom Davis Arena	Zamboni	1
Countryside Arena	Zamboni	1
TOTAL		**22**

Excluding the dedicated Zamboni chargers, the remaining 20 chargers are currently serving 29 EV's. This represents significant capacity for future EV additions to the fleet at some of these facilities.

Figure 7 below illustrates the planned number of chargers and EV's upon implementation. These figures are based on the number of vehicles per facility where a 3:1 vehicle to charger ratio is a maximum and 1:1 is required where only one vehicle per facility exists.

Figure 7: Planned Charging and Vehicle Inventory			
Vehicles	**Charger Level**	**Number of Vehicles**	**Number of Chargers**
Light Duty Fleet	2	159	89
Zamboni	Zamboni	18	18
TOTAL		**177**	**107**

Facilities

A full replacement of light duty vehicles across the City may require investments into electrical infrastructure at various facilities to ensure adequate power supply is present. Many facilities will have adequate power supply for a limited number of charging stations. However, major depots such as Frobisher, St. Clair and Kathleen Street Depot that house significant operations may require further investment to expand the power supply to the facility. An estimate for this investment is included in the financial analysis.

Fleet E.V Transition Financial Analysis

The analysis considers two scenarios:

1) Baseline – This is a business-as-usual case that considers no transition to EV's and the continued replacement of vehicles with new ICE vehicles.
2) Electric Vehicle Transition- This considers the replacement of all I.C.E. light duty and ice resurfacing fleet by 2035 with the modelled EV in the respective category.

The financial analysis includes capital costs associated with baseline (continuing with ICE vehicles) and with new electric vehicle purchases including associated charging infrastructure. It also compares maintenance and fueling costs for the baseline scenario of continuing with ICE vehicles versus EV's.

The analysis considers the cash flow required from 2026-2036 required to fund the EV transition. These costs are inflated at 3% annually and are representative of expected costs in the year the expenditure is incurred. This includes all associated costs over the implementation period only and does not justify the business case. Rather it provides the financial information that can be used to plan and budget throughout the transition period.

A lifecycle analysis is also utilized to provide the information necessary in deciding whether to transition to EV's or continue with the baseline scenario. This lifecycle analysis considers all costs above and is exclusive to the lifecycle of each vehicle type. Thus, providing for a consistent and comparable timeframe amongst the two options. The lifecycle analysis presents all dollar values in net present value (NPV) terms. NPV analysis accounts for the "time value of money," the principle that a dollar today is worth more than a dollar tomorrow. The discount rate used is 4% and is consistent with the City's opportunity cost of money as defined by an average annual return on its investment portfolio.

Vehicle Capital Costs

Figure 8 below depicts the unit cost assumptions for I.C.E and EV's per category. The capital cost for EVs include all associated charging infrastructure costs. The expectation is that the light duty fleet will be replaced at a one-to-one ratio. The light duty and Zamboni fleet size is expected to remain consistent throughout the transition to EV's.

Figure 8: Capital Cost Assumptions (2025 $'s)

Vehicle Type	E.V Capital Cost	I.C.E Capital Cost	Quantity of Vehicles
Full Size Van	79,000	60,000	16
Minivan	67,000	48,000	15
Sedan	57,000	35,000	7
SUV	59,000	40,000	21
1/2 Tonne Pickup	70,000	55,000	71
Zamboni	185,000	130,000	16

Fueling and Maintenance Consumption and Costs

Traditional fuel consumption is modelled per vehicle based on the historical average fuel usage in the respective vehicle category. Electricity consumption is based on the equivalent kwh for the respective electric vehicle that was modelled for the category. Figure 9 below outlines the fuel consumption per category for both ICE and EVs.

Figure 9: Average Annual Fuel Consumption per Category- Gasoline and Electricity		
Category	**Gasoline Consumption (L)**	**Electricity Consumption per Vehicle (kWh)**
Sedan	1,020	3,360
SUV	1,518	5,490
Minivan	1,875	5,823
Full-Size Van	2,766	6,360
½-Ton Pickup Truck	3,403	9,968

Fueling Cost Assumptions

For gasoline fuel costs, $1.09 per litre was used for 2025. This is reflective of the average 2025 wholesale price for gasoline that has been incurred by the City. The cost of electricity used is $0.14/kWh. Traditional fuel costs for the Zamboni fleet utilized historical propane use and cost data with the electrical alternative presenting a 70% savings. All prices are escalated at the rate of 3% annually to reflect general inflationary pressures. No considerations were provided for any potential price shocks in the energy markets.

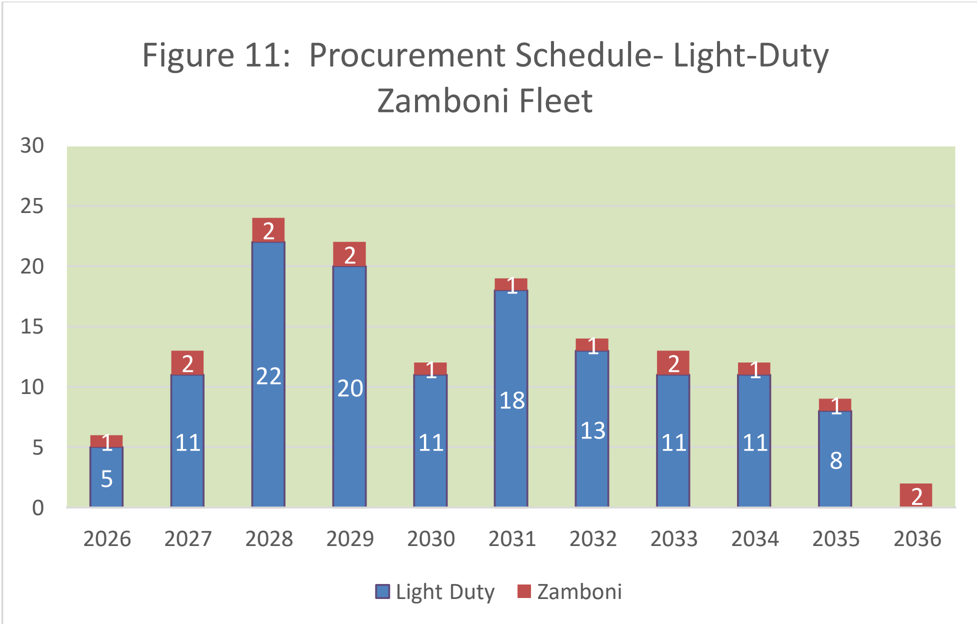
Maintenance Cost Assumptions

Applicable maintenance costs per category are detailed below in Figure 10 below. Research by the U.S. Department of Energy's Argonne National Laboratory concluded that BEV maintenance costs are 40% below ICE vehicles. As a result, maintenance costs used to model EVs are 60% of the maintenance costs of the conventional ICE City fleet. All maintenance costs are escalated at the rate of 3% annually to reflect general inflationary pressures.

Figure 10 Estimated Annual Maintenance Costs - 2025 $'s		
Category	**ICE**	**EV**
Sedan	$1,200	$720
SUV	$1,500	$900
Minivan	$1,400	$840
Full-Size Van	$1,500	$900
½-Ton Pickup Truck	$1,900	$1,140
Zamboni	$8,500	$4,500

Replacement Schedule

The replacement schedule for both scenarios will be identical. The replacement schedule per year of the implementation is identified below in Figure 11 and delineated between light-duty fleet and the Zamboni fleet.



Cash Flow Model: Baseline and EV Transition

Scenario 1 - Baseline

This scenario contemplates the continued use and replacement of ICE fleet with new ICE vehicles. The only EV's that exist in this scenario are those that exist in the fleet as of 2025.

Baseline Capital Cost Estimates

Fleet lifecycles are used to determine the replacement schedule of the existing fleet. This scenario consists of all I.C.E vehicles being replaced with ICE vehicles. Capital and Maintenance costs are escalated at 3% per year and are identified in Figure 12 over the 2026-2036 period.

Figure 12: Baseline Scenario - Capital Expenditures											
Year	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**
Cost	316,000	714,820	852,964	881,831	625,783	409,224	507,472	725,626	538,377	502,338	497,249

Baseline Maintenance Cost Estimates

Figure 13 highlights the total vehicle maintenance cost estimates under the baseline scenario. These are escalated at 3% annually.

Figure 13: Baseline Scenario - Maintenance Expenditures ($)											
Year	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**
Cost	355,800	366,474	377,468	388,792	400,456	412,470	424,844	437,589	450,717	464,238	478,165

Baseline Fuel Expenditures

These cost estimates are based on gasoline and propane costs for light-duty and the Zamboni fleet respectively. Annual fuel cost is calculated using average kilometres travelled at $1.09 per litre and inflated annually at 3%. Fuel costs for Zambonis were calculated using the average cost of consumption per unit.

Figure 13: Baseline Scenario - Fuel Expenditures ($)											
Year	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**
Cost	448,789	462,253	476,120	490,404	505,116	520,270	535,878	551,954	568,513	585,568	603,135

Summary

In the baseline scenario, the total costs incurred during the transition period are itemized in Figure 14 and total $16.88 million over the 2026-2036 time-period.

Figure 14: Baseline Summary	
Category	**Cost ($)**
Capital	6,571,683
Maintenance	4,557,014
Fuel	5,748,000
Total	**16,876,696**

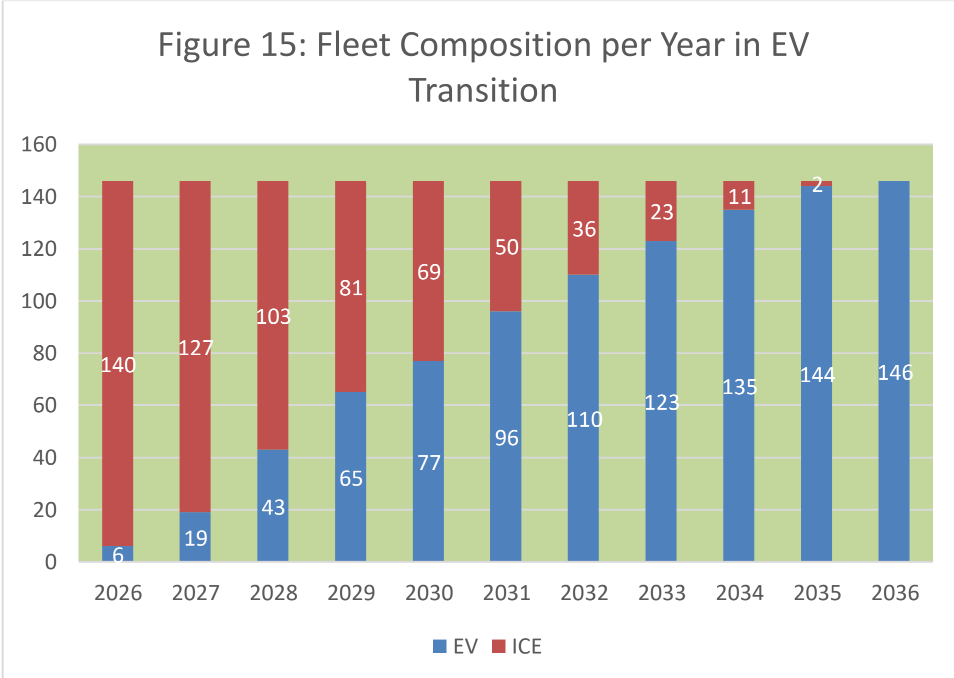
Scenario 2 – EV Transition

This considers the replacement of all ICE light duty and ice resurfacing fleet by 2036 with the modelled EV in the respective category.

The financial analysis includes capital costs for new electric vehicle purchases, associated charging infrastructure, charger maintenance costs and costs related to the phase-out of ICE vehicles over the time-period. It also outlines maintenance and fueling costs for EV and ICE units over the phasing period. Replacements schedules are based on the lifecycles of existing vehicles.

EV Transition Capital Cost Estimates

Fleet lifecycles are used to determine the replacement schedule of the existing fleet. This scenario consists of all I.C.E vehicles being replaced with EVs at the end of useful life. Figure 15 below identifies the changing composition of the light-duty and Zamboni fleet by year and over the course of the transition period. The light-duty fleet will be fully transitioned by 2035 and the Zamboni fleet fully transitioned by 2036.



Capital and Maintenance associated with this transition are detailed by year in Figure 16 below. These costs are escalated at 3% per year.

Figure 16: EV Transition Scenario - Capital Expenditures											
Year	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**
Capital	516,000	1,192,740	1,952,056	1,864,192	1,093,995	1,692,540	1,289,576	1,359,011	1,126,159	966,837	497,249

EV Transition Maintenance Cost Estimates

Figure 17 and 18 highlight the total vehicle maintenance cost estimates under the EV transition scenario. The maintenance costs are segregated by those related to the phase in of EVs and by those born by the phase-out of ICE vehicles. Figure 17 displays this transition graphically over the 2026-2036 period, while Figure 18 details the annual expenditures by category including the maintenance for the charging infrastructure. These costs have been escalated at 3% annually.

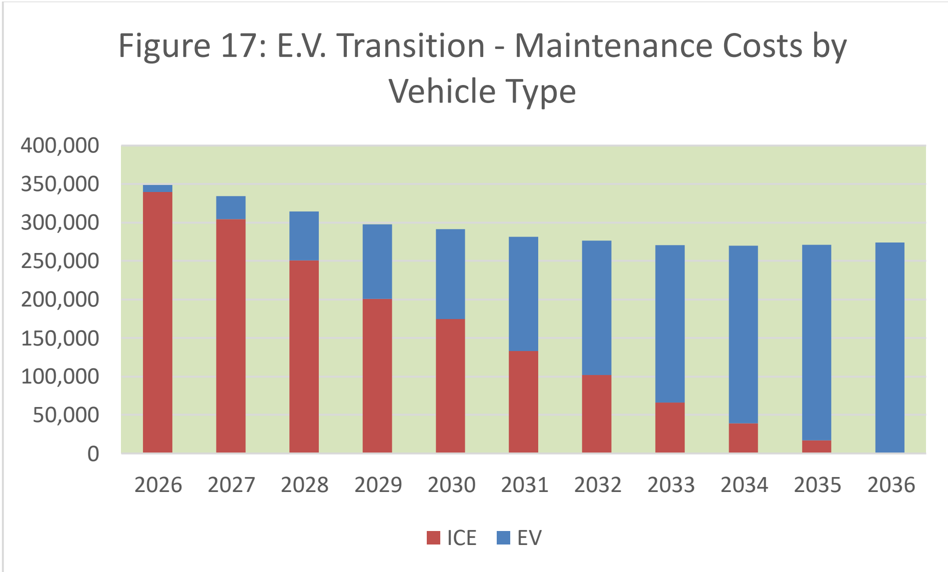


Figure 18: EV Transition Scenario - Maintenance Expenditures											
Year	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**
ICE	339,500	304,300	250,400	200,700	174,600	133,200	102,000	66,100	39,100	17,000	0
EV	9,180	29,973	63,909	97,100	116,963	148,573	174,666	204,922	230,831	254,274	273,998
Charger	800	2,884	5,443	9,314	12,065	16,135	20,327	24,233	28,256	31,576	33,759
Total	349,480	337,157	319,751	307,114	303,628	297,908	296,993	295,255	298,187	302,850	307,757

EV Transition Fuel Expenditures

Based on the capital acquisition year of the respective EV's fuel costs will transition from gasoline to electricity. This transition is displayed in Figure 19 below. Annual fuel cost is calculated using average kilometres travelled at $1.09 per litre and inflated annually at 3%. Fuel costs for Zambonis were calculated using the average cost of consumption per unit. Average consumption for EVs is detailed in Figure 9 above and is costed using $0.14/kWh. Figure 20 details by year the cost of fuel in the respective categories.

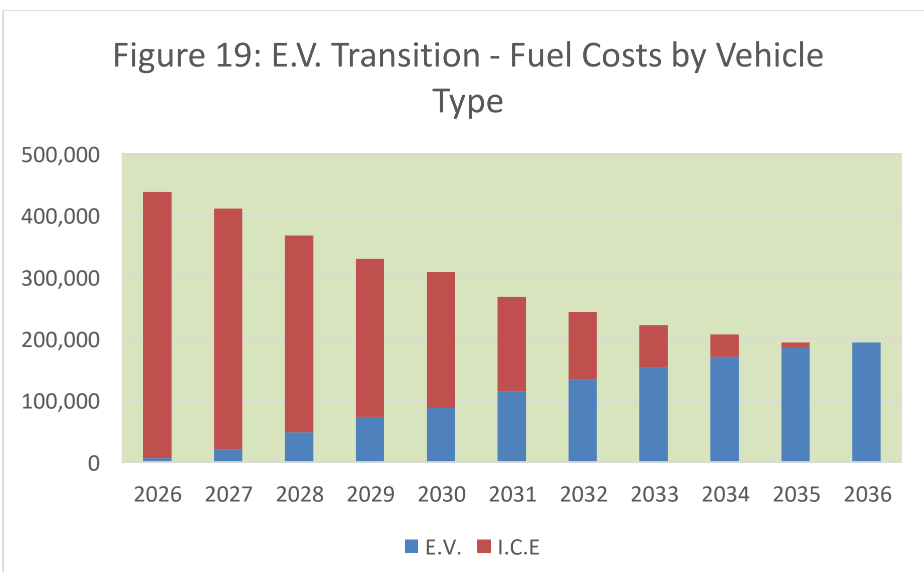


Figure 20: EV Transition Scenario - Fuel Expenditures											
Year	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**
EV	6,092	20,769	47,890	72,782	87,410	114,761	134,654	153,432	170,824	186,049	194,031
I.C.E	432,171	390,448	319,948	257,020	220,923	153,209	108,541	68,651	36,177	8,000	0
Total	**438,263**	**411,217**	**367,838**	**329,801**	**308,333**	**267,970**	**243,195**	**222,083**	**207,001**	**194,049**	**194,031**

Summary

In the EV transition scenario, the total costs incurred during the transition period are itemized in Figure 21 and total $20.15 million over the 2026-2036 time-period. This is higher than the $16.88M transition period costs exhibited under the baseline scenario because of the higher capital cost of EVs.

Figure 21: EV Transition Summary	
Category	**Cost ($)**
Capital	13,550,355
EV Maintenance	1,604,387
ICE Maintenance	1,626,900
Charger Maintenance	184,792
EV Fuel	1,188,693
ICE Fuel	1,995,087
Total	**20,150,213**

Lifecycle Cost Analysis

The lifecycle analysis is used to provide the information necessary in making the decision to transition to EV's or continue with the baseline scenario. This lifecycle analysis considers all capital, maintenance and fueling costs exclusive to the lifecycle of each vehicle type. This approach provides for a consistent and comparable timeframe amongst the two options. The lifecycle analysis presents all dollar values in net present value (NPV) terms. NPV analysis accounts for the "time value of money," the principle that a dollar today is worth more than a dollar tomorrow. The discount rate used is 4% and is consistent with the City's opportunity cost of money as defined by an average annual return on its investment portfolio. A general 3% escalation rate was applied to estimate future capital expenditures, based on the Bank of Canada's long term inflation target of 1-3%.

Figure 22: Net Present Value of E.V. and I.C.E Over Projected Lifecyles (2025 $'s)														
	Sedan		SUV		Minivan		Full Size Van		1/2 Ton Pickup		Zamboni		TOTALS	
	ICE	EV	ICE	EV	ICE	EV	ICE	EV	ICE	EV	ICE	EV	ICE	EV
Capital	35,000	57,000	40,000	59,000	48,000	67,000	60,000	79,000	55,000	70,000	130,000	185,000	368,000	517,000
Maint	11,494	6,896	14,367	8,620	13,410	8,046	14,367	8,620	18,199	10,919	119,266	63,141	191,103	106,242
Fuel	10,649	4,506	15,848	7,362	19,575	7,808	28,878	8,529	35,529	13,366	56,125	16,838	166,604	58,409
Total per Ur	57,143	68,402	70,215	74,982	80,985	82,854	103,245	96,149	108,728	94,285	305,391	264,979	725,707	681,651
Quantiy	7	7	21	21	15	15	16	16	71	71	16	16	146	146
Weighted C	**400,001**	**478,814**	**1,474,515**	**1,574,622**	**1,214,775**	**1,242,810**	**1,651,920**	**1,538,384**	**7,719,688**	**6,694,235**	**4,886,256**	**4,239,664**	**17,347,155**	**15,768,529**

Figure 22 above presents the NPV of associated costs for ICE and EVs in each vehicle category. Expenditures are further delineated by capital, maintenance and fuel over the lifecycle of the category and are calculated on a per vehicle basis using the assumptions outlined earlier in the report. The results indicate that high upfront costs can be overcome by maintenance and fuel savings for the proposed EV transition scenario. Overall, the EV transition scenario would result in NPV savings of $1.6M or 9.1% in all categories. Some categories present a positive individual NPV. Those categories are full-size vans, ½ ton pickups and the Zamboni fleet. These NPV analysis suggests a relative savings of 6.9%, 13.3% and 13.2% respectively. Alternatively, the upfront capital costs of the Sedan, S.U.V and Minivan class could not be made-up via the operational savings. This is largely attributable to the lower use of these vehicles resulting in less fuel savings. Additionally, the EV capital cost is proportionately higher in these categories. The NPV suggests that the transition to EVs in these categories are 19.7%, 6.8% and 2.3% more expensive over the life of the vehicles.

Summary

The financial analysis was undertaken to determine the cash flow of potential transition costs associated with the EV transition scenario and whether higher EV capital costs can be overcome by savings derived from reduced maintenance and fuel costs. This portion of the analysis only considers the direct financial impact to the City. There is no attempt to monetize the indirect cost savings associated with the public benefit of indoor air quality (Zambonis) and/or reduced greenhouse gas (GHG) emissions.

Further, the analysis does not consider the potential of capital costs being partially funded by grant or incentive funding. There are potential funding sources for both EV purchases and associated charging infrastructure. Successful applications to these potential funding opportunities (FCM Green Municipal Fund or iZEV) will affect the results of the financial analysis. As of the date of this plan, the Incentives for Zero-Emission Vehicles (iZEV) Program funds have been fully committed. Consequently, the iZEV Program has now officially been paused.

Results of the lifecycle cost analysis suggests that 2 options are available to further electrify the fleet.

1) Convert to EV only those categories of vehicles that have a positive NPV. These would include the full-size vans, ½ ton pickup and Zamboni categories. This would limit the benefit of GHG reductions to only those categories identified above.
2) Convert all light-duty and Zamboni fleet to EV as the collective NPV is positive. These would see the largest GHG reductions and extend electrification to the full light duty and Zamboni fleet with minor exceptions.

GHG Emissions Analysis

The analysis of GHG reductions is based on estimates used to quantify emissions of liters of fuel and kWh of electricity consumed for conventional and EVs respectively. The emission rate for all fuel types and individual vehicle types was obtained from Natural Resources Canada. The emissions were calculated over the total useful life of the vehicle. The ice resurfacing fleet utilized an estimate of GHG reductions based on the experience of similar organizations.

Annual GHG reductions (tonnes) are displayed in Figure 23 below. The result of a conversion to an EV fleet saves approximately 93% of the GHG emission when compared to the conventional ICE vehicles. Upon conversion of all in scope vehicles the annual total GHG reductions will be approximately 620 tonnes.

Figure 23: Annual GHG Reduction in Tonnes by Vehicle Category

	Sedan	SUV	Minivan	Full Size Van	1/2 Ton Pickup	Zamboni	TOTAL
Annual Reduction	1.8	2.5	3.6	4.6	4.9	4.9	22.4
Vehicle Count	7.0	21.0	15.0	16.0	71.0	16.0	
Total Annual Reduction	12.8	52.9	54.6	73.3	349.7	77.8	621

Staffing & Training

The transition to EVs will require proper training on systems and subcomponents critical to ensure safe and efficient operation of the EV fleet. The City of Greater Sudbury continues to work with internal and external training programs while in close coordination with OEMs and neighboring municipalities to prepare the existing workforce for the new technology, avoiding any displacement of the existing workforce.

A phased approach will be implemented for EV training. As the number of zero emission vehicles in the fleet increases, more mechanics will complete zero emission maintenance training. CGS will look for opportunities to develop a core group of subject matter experts to serve as EV fleet specialists. This approach will proactively develop qualified fleet specialists through hands-on experience and learning.

Project Risks & Mitigation Strategies

Risk	Description	Response
Infrastructure Transition	Proliferation of EVs in the fleet require that infrastructure is installed to integrate them into service. Coordination with third parties, such as utilities and infrastructure manufacturers, can often result in lengthy timeframes and disruptions to current operations.	Planning of infrastructure requirements prior to vehicle acquisition to ensure construction considerations are made while maintaining current operations.
Resource Availability	Implementation requires resources that may be limited and could lead to additional costs, and delays.	Identify key personnel who will be responsible for coordinating procurement & technician training.
Supply Chain Disruptions	Trade disputes, shortages of electrical subcomponents, replacement parts, or increased demand for EVs may cause procurement delays.	Build sufficient lead time into planning. Identify critical spare parts and suppliers.
Utility Disruption	Utility blackouts, infrastructure failures, natural disasters or extreme weather events.	Assess the likelihood of power outages and develop mitigation plans Utilize asset management planning to identify critical electrical components that may be replaced.
Technology Obsolescence	New technologies that are advancing may not be compatible with the most advanced technology in the space.	Understanding of the marketplace prior to procurement can alleviate this. Spare components may need to be acquired and stored.

Broad Risks with Limited Mitigation Ability

Political

The changing political environment in the United States has had significant impact on the auto industry and the regulatory environment for climate change. Legislation has been enacted to eliminate the electric vehicle mandate. This included the removal of EV subsidies on both new and used EVs and the removal of carbon credits that have been instrumental in encouraging EV production. In addition to the United States withdrawing from the Paris Agreement, the Environmental Protection Agency (EPA) in the United States is seeking to repeal a 2009 endangerment finding that found carbon dioxide and five other gases threatens the public health and welfare of current and future generations. This 2009 finding has been the basis for vehicle and power plant emissions regulation under the Clean Air Act.

The Canadian government enacted an Electric Vehicle Availability Standard to assist in reducing greenhouse gas emissions and combating climate change. This mandate requires automakers to have a 100% light duty electric vehicle lineup in Canada by 2035. Although the standard is intended to accelerate electric vehicle adoption, there has been resistance from some automakers that contend the targets are unrealistic under current market conditions and supply chain challenges. Concerns over job security and the economic impact of the regulation has prompted calls from industry representatives for a review of the mandate.

Additionally, the federal government has put a pause on the Incentives for Zero-Emission Vehicles (iZEV) Program citing a commitment of existing funds. The iZEV program provided $5,000 for purchases of EVs at point of sale.

Financial

Ever changing and increasingly confusing trade constraints on the automotive industry and associated input industries may limit the Canadian offerings of EV’s and/or increase the prices to a non-competitive level.