



RICHMOND
Sustainability Initiatives

Highlights of Sustainable Fleet Strategy: Framework & Action Plan

Prepared for the City of Brampton Council
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Presentation Overview - Framework & Action Plan

- 1) Results of data modelling we completed to evaluate cost and GHG emission impacts of fuel-reduction solutions relative to 2019 baseline over a 15-year budget cycle
- 2) Cost estimations of electric vehicle supply equipment (EVSE) charging requirements over 15-year budget cycle
- 3) An overview of discounted cashflow analysis to assess purchasing v. leasing v. renting fleet assets
- 4) High-level fleet-wide recommendations for low-carbon fleet options in the short-term, and a structured, phased-in long-term transition to battery-electric vehicle (BEVs) for City of Brampton's three major fleets: Fleet Services (Corporate fleet), Fire & Emergency Services, and Brampton Transit



Low-Carbon Fleet Planning – 3 Groups of Options

- **Group One Solutions: Best management practices (BMPs)**
 - Enhanced specs: light-weighting, lower-rolling resistance (LRR) tires
 - Driver behaviours: eco-training & anti-idling policy/technologies
 - Transportation demand management (TDM): route-planning/optimization & trip reduction
- **Group Two Solutions: Fuel-switching**
 - E85, B10, CNG, LPG for appropriate units
- **Group Three Solution: BEV phase-in**
 - Deferred replacement of ICE units until BEV replacements available



Data-Modelling – Summary of Fleet-Wide Results

Group	FAR Scenario Description	Implementation Timing	Average Annual Vehicle Replacement Capex (\$ mil)	Average Annual Opex Impacts Over 2019 Baseline (\$ 000s)	Annual Tailpipe GHG Reduction Over 2019 Baseline (tonnes CO _{2e})	Annual Tailpipe GHG Reduction Percentage Over 2019 Baseline
One	Enhanced specs: light-weighting, LRR (all units)	Immediate	7.4	+217	230	6%
	Driver behaviours: eco-training & anti-idling policy/technologies (all units)	Immediate	7.4	+205	812	21%
	Route planning/optimization & trip reduction (all units)	Immediate	7.4	+203	637	16%
	All BMPs (all solutions above, for all units)	Immediate	7.4	+227	1,372	35%
Two	Fuel switch: E85 (all flex-fuel units)	Immediate	7.4	-128	2,137	54%
	Fuel switch: B10 (annualized blend – all diesel on-road units)	Immediate	7.4	-119	1,512	38%
	Fuel switch: CNG (all applicable units)	Immediate	7.4	-472	1,849	47%
	Fuel switch: LPG (all applicable units)	Immediate	7.4	-437	1,599	41%
Three	BEV phase-in: cars & SUVs starting immediately, pickups & vans starting in 2022, vans, and medium- and heavy-duty (MHD) trucks starting in 2024; includes Fire & EMS light-duty (LD) phase-in only	Immediate - 2035	7.9	+315	3,376	86%



Data-Modelling – Summary of Fleet-Wide Results

- Driver eco-training and anti-idling policy/technologies, if fully implemented fleet-wide, have the greatest GHG-reduction **of all BMPs**, based on our modelling.
- Switching all flex-fuel units to **ethanol 85 (E85)** has the greatest GHG-reduction potential of all fuel-switching options, based on our modelling.
- All fuel-switching solutions, particularly **compressed natural gas (CNG)**, are shown to be **cost-effective** at the fleet-wide level, based on our modelling.
- **Transitioning to BEVs** is the **most effective long-term** GHG-reduction solution for Brampton's fleets, but it does come at a **slightly higher cost** based on our modelling.
*Note: This is **expected to change** as EVs reach cost parity with fossil-fueled vehicles.*



EVSE (EV Chargers) Long-Term Costing Outlook

Year # of BEV Phase-in Plan	Year of BEV Phase-in	Location	Number of BEVs added to Brampton Fleets (per phase-in plan)	Cumulative Number of BEVs added to Brampton Fleets (per phase-in plan)	Number of BEVs Served by each L2 Charger	Number of L2 Chargers Required to Meet Demand	Number of L3 Chargers Required	Cumulative Number of L2 Chargers Required to Meet Demand	Estimated Number of L2 Chargers Required for Purchase (to outpace demand)	Estimated Cost per Charger (after grants & subsidies)	Total Cost of Chargers	Cumulative Cost of Chargers
1	2021	Williams Parkway	-	-	-	-	2	-	-	\$60,000	\$120,000	\$120,000
	2021	Sandalwood Parkway	-	-	-	-	2	-	-	\$60,000	\$120,000	\$240,000
	2021	Flower City Community Campus	-	-	-	-	2	-	-	\$60,000	\$120,000	\$360,000
	2021	All Brampton Fleet Parking Sites	8	8	2	4	0	4	20	\$7,500	\$150,000	\$510,000
2	2022	All Brampton Fleet Parking Sites	83	91	2	42	0	46	60	\$7,650	\$459,000	\$969,000
3	2023	All Brampton Fleet Parking Sites	118	209	2	59	0	105	60	\$7,803	\$468,180	\$1,437,180
4	2024	All Brampton Fleet Parking Sites	65	274	2	33	0	138	20	\$7,959	\$159,181	\$1,596,361
5	2025	All Brampton Fleet Parking Sites	47	321	2	24	0	162	20	\$8,118	\$162,365	\$1,758,726
6	2026	All Brampton Fleet Parking Sites	53	374	2	27	0	189	20	\$8,281	\$165,612	\$1,924,338
7	2027	All Brampton Fleet Parking Sites	26	400	2	13	0	202	20	\$8,446	\$168,924	\$2,093,263
8	2028	All Brampton Fleet Parking Sites	45	445	2	23	0	225	20	\$8,615	\$172,303	\$2,265,565
9	2029	All Brampton Fleet Parking Sites	36	481	2	18	0	243	20	\$8,787	\$175,749	\$2,441,314
10	2030	All Brampton Fleet Parking Sites	58	539	2	29	0	272	20	\$8,963	\$179,264	\$2,620,578
11	2031	All Brampton Fleet Parking Sites	91	630	2	28	0	300	20	\$9,142	\$182,849	\$2,803,427
12	2032	All Brampton Fleet Parking Sites	59	689	2	0	0	300	0	\$9,325	\$0	\$2,803,427
13	2033	All Brampton Fleet Parking Sites	60	749	2	0	0	300	0	\$9,512	\$0	\$2,803,427
14	2034	All Brampton Fleet Parking Sites	45	794	2	0	0	300	0	\$9,702	\$0	\$2,803,427
15	2035	All Brampton Fleet Parking Sites	49	843	2	0	0	300	0	\$9,896	\$0	\$2,803,427



Discount Cash Flow Analysis (Sedans)

Vehicle Acquisition Option	Lifecycle Total Cost of Ownership - 40 Units	Savings or (Additional Cost) Over Lowest Cost Option
Option 1: Purchase	\$3,431,399	\$0
Option 2a: Closed End Lease	\$3,850,007	(\$418,608)
Option 2b: Open End Lease	\$3,689,404	(\$258,005)
Option 3: Rent	\$3,651,353	(\$219,954)

The exception is high-mileage applications (i.e., Transit rental vans) for which rentals were the lower cost option

Summary of Key Recommendations

- **Fuel Switching – E85 Ethanol**

- Consider E85 as a “messy-middle” solution while its fleet slowly transitions to battery electric vehicles (BEVs).
- Consider a pilot project with several units switched to E85 to determine the fuel-efficiency loss and cost-effectiveness; if successful, consider switching other appropriate units.

- **Fuel Switching – Compressed natural gas (CNG)**

- We recommend that Fleet Services consider CNG only as an optional, secondary GHG reduction solution for MHDVs, as a commitment to CNG fuelling infrastructure may not be a prudent choice for the long-term.



Summary of Key Recommendations

- **Battery-Electric Vehicle Phase-In**

- Consider a **pause on purchasing new internal combustion engine (ICE) vehicles** (when appropriate) for the short term (one year for pickups, three years for medium- and heavy-duty vehicles, while awaiting BEV counterparts to become available).
- Consider allocating the majority of fleet capital spending on BEVs (for appropriate vehicle categories as BEV models become available).
- Strictly through a lens of fiscal planning, our recommendation is to prioritize unit replacement of ICE units with BEVs that would deliver ROI – typically ones that have relatively high annual mileage.



Summary of Key Recommendations

- **Electric Vehicle Supply Equipment**

- In the short-term, we recommend that the City of Brampton allocate capital towards charging infrastructure required for the transition to BEVs for all vehicle categories.
- The additional capital costs associated with electric vehicle supply equipment (EVSE) can be offset through reduced capital spending during the pause we are recommending for purchasing internal combustion engine (ICE) medium- and heavy-duty vehicles and pickups.



Discussion and Questions