Clean Air Partnership

Briefing Note

October 2021

Municipal Green Fleets Business Case

Introduction

1. Canadian municipalities have set greenhouse gas (GHG) reduction targets to help mitigate climate change. In Ontario, Transportation contributed to 43.9% of total GHG emissions in 2019. Sustainable transportation options, including fleet electrification, are key to achieving municipal climate commitments.

2. Electric Vehicles (EVs) provide an attractive option towards advancing municipal climate targets given their ability to reduce GHGs. Additionally, air quality improvements from EVs are directly linked with public health benefits.

3. Aspects like installation of charging infrastructure, driver training, the total cost of ownership, vehicle administration costs, lifetime fuel and maintenance costs, etc. need to be considered by the municipalities before investing in EVs.

EV Procurement Considerations

4. ***Availability*** - A large range of EV options are available for mostly light-duty/passenger vehicles. Currently, there is a lack of options for commercial EV pickup trucks, vans, and class 3-5 trucks which represent a significant portion of the municipal fleet. Presently, municipalities are deploying electric buses and electric fleet vehicles such as ice resurfacers.

5. ***Charging*** - Three types of charging mechanisms are available for EVs
   - Level 1 chargers are specialized power cords that use a standard household outlet (Residential use).
   - Level 2 chargers are specialized stations that charge an EV up to 7 times faster than a level 1 charger.
   - Level 3 chargers are used commercially and for public charging on highways.

   Smart EV chargers, connected to the internet, manage charging costs and time, dispatch schedules, environmental conditions (external temperature) and other factors which are particularly useful for municipal EV fleet management.

6. ***Charging Infrastructure*** - Electric Vehicle Supply Equipment (EVSE), known simply as a charger, transfers electricity from the grid to the EVs. A charging station is equipped with one or more cables to charge EVs. It is important to consider the daily range the charger needs to provide and the charging time available, before installing charging infrastructure.

7. ***Emissions*** - Environmental concerns regarding manufacturing EV batteries can be a barrier to purchase. Two Canadian studies[1,4] have estimated that EVs charged from clean sources in Canada can pay off this environmental burden within three years after which every kilometer driven is carbon negative. Retired EV batteries can either be repurposed or recycled to obtain the raw materials.

EV Costs and Benefits

8. ***Vehicle Costs*** - Depending on the make and model, EVs costs range from $36,000 to $90,000 CAD for passenger vehicles. A fleet assessment helps municipal fleet managers understand which EV best suits their needs. Tools like Plug N' Drive Discovery Centre and FleetCarma EV Suitability Assessment can be used to determine suitable EVs.

9. ***Charging Infrastructure Costs*** - Significant resources are needed for building EV charging infrastructure. Planning, time, expertise, and collaboration are required to correctly size EV parking and charging for fleet applications. Some factors to consider include electrical service upgrades, distance to the electric panel, the number of stations installed, indoor versus outdoor installations, permits and inspection costs.

10. ***Training Costs*** - To maximize EV efficiency, drivers need to be trained on conserving vehicle momentum, avoiding harsh braking, and refuelling. FleetCarma has created A Simple Training Guide for New Electric Car Drivers that highlights key points of electric car driving. EV centers across Canada, such as Plug N' Drive, Vehicle Technology & Education Centre, and Plug In BC provide opportunities for drivers to test various electric cars.

11. ***Maintenance Costs*** - EVs have substantially lower maintenance costs as they have fewer moving parts and fluids. A Canadian study of 2,400 cars showed 47% average cost savings in maintenance of operating an EV as compared to the conventional Internal Combustion Engine Vehicles (ICEV)[2].

12. ***Fuel Costs*** - Fuel costs vary according to local electricity prices. Lifetime fuel cost can be determined by extrapolating energy costs over a vehicle's projected annual mileage and expected service life. The NRCan fuel consumption rating search tool estimates fuel economy allowing for comparison between ICEV and EV.

13. ***GHG Reduction Benefits*** - Every liter of gasoline burned generates about 2.3 kilograms of CO_2. Due to the relatively clean grids in Quebec, British Columbia, Ontario and Manitoba, life cycle emission reductions of over 83% are estimated when replacing an ICEV with an EV[1]. The average annual reduction in GHG emissions from replacing a conventional vehicle with a comparable EV in Ontario is 4.6 tonnes of CO_2.

14. ***Air Quality Benefits*** - Research shows that in the Greater Toronto and Hamilton Area, air pollution leads to over 3,000 premature deaths every year. The same study showed that shifting to 100% electric cars would result in 313 fewer premature deaths per year and provide up to $2.4 billion per year in social benefits[3]. EVs also help reduce traffic-related noise pollution.

15. ***Community Leadership Benefits*** - Municipalities across Canada are demonstrating leadership by adopting EVs and facilitating the community transition towards EVs. For example, Plessisville, Quebec, allows community members to rent the two City-owned EVs. The City's three double EV chargers are available for free public use.

EV Business Cases

16. ***Clean Air Partnership Total Cost of Ownership Model*** - This model compares the total cost of ownership and total lifetime emissions of a similar-sized, light-duty/passenger ICEV with an EV in Ontario. The cars chosen for this study are a 2019 Ford FUSION S (ICEV) and a 2019 Chevrolet BOLT (EV).

17. Aspects like incentives, lifetime maintenance and fuel costs, carbon tax, driving and maintenance practices, etc. were calculated. Annual CO_2 emissions were also calculated for a span of 7 years for both vehicles. The total cost of EV ownership, in this case, was calculated to be **$1,695** less than ICEV and the EVs saved **13,022 kg** CO_2 emissions over its lifetime.

18. ***City of London Electric Ice Resurfacers*** - One of the actions in the City of London's Corporate Energy Conservation & Demand Management Plan was to electrify their ice resurfacing fleet. The City proposed replacing its entire fleet of 14 ice resurfacers with electrical units from 2020–2023. This business case compared the total cost of ownership and total CO_2 emissions between natural gas and electrical ice resurfacer units.

19. The results revealed that even though the initial cost of the electric ice resurfacers was 32% higher than the conventional models, an estimated $53,810 was saved in operational costs for all 14 EV units over the 2020–2023 period. Switching the entire ice resurfacer fleet to electric would contribute to reducing 212 tonnes of GHG emissions annually which accounts for approximately 25% of the City's corporate GHG reduction target.

Municipal Implications

20. With technological upgrades and the availability of widespread charging infrastructure, municipal fleet electrification barriers are fading. Positive business cases demonstrate that EVs are less costly to own and maintain, and contribute greatly to the City's GHG reduction targets. Additionally, they also provide economic, social and environmental benefits.

21. The Clean Air Partnership Green Fleets Business Case Series report provides detailed information on the considerations that fleet managers can include in their EV business case development.

22. ***Next Steps*** - Municipalities need to test this methodology in real-world conditions. This will help improve municipal EV business case development and produce objective and reliable information on the actual Total Cost of Ownership, Return on Investment, and GHG reductions.

23. Municipalities are encouraged to share their EV business cases through the Clean Air Council network. This sharing, coupled with regulatory and incentive support from higher orders of government, is key to the advancement of municipal fleet electrification.

Related Webinars and Further Reading

24. Green Fleets Business Case Series report

25. Green Fleets Workshop

26. Municipal electric champions show how it's done

References

1. R. Logtenberg and B. Saxifrage, 2017, Comparing Global Warming Impacts of Electric and Gas Powered Vehicles by Electrical Region, 2 Degree Institute, Canada
2. Vincentric, 2011, Canadian Total Cost of Ownership, Canada
3. Environmental Defence, Ontario Public Health Association, CLEARING THE AIR: How Electric Vehicles and Cleaner Trucks Can Help Reduce Pollution, Improve Health and Save Lives in the Greater Toronto and Hamilton Area, 2020, Toronto, Canada
4. Laboratory for Alternative Energy Conversion, Plug-in BC, 2018, Environmental Life Cycle Assessment of Electric Vehicles in Canada, BC, Canada

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