Council Report

Report Number:	**FL2023-002**
Meeting Date:	December 12, 2023
Title:	**Feasibility of Transition of Fleet to Electric Update**
Description:	Establish a feasibility plan for the transition of the City's non-emergency fleet to electric vehicles
Author and Title:	Rodney Porter, Manager of Fleet and Transit, Public Works

Recommendation(s):

That Report FL2023-001, **Feasibility of Transition of Fleet to Electric Update**, be received.

Department Head: _____

Financial/Legal/HR/Other:_____

Chief Administrative Officer:_____

Background:

At the Council Meeting of February 23, 2021, Council adopted the following resolution:

> **CR2021-113**
> **Moved By** Councillor Veale
> **Seconded By** Councillor Yeo
>
> **That** Report FL2021-001, **Fleet Services Review**, be received
>
> **Carried**

> **CR2021-114**
> **Moved By** Councillor Veale
> **Seconded By** Councillor Richardson
>
> **That** Staff establish a feasibility plan and a timeline for transforming the City's Fleet to electric vehicles and report back by the end of Q4, 2021.

This report addresses that direction.

The City was unsuccessful in obtaining funds through the 2021 and 2022 Natural Resources of Canada (NRCan) Grant process which has delayed implementation of the recommendations outlined in the original report FL2021-001, **Feasibility of Transition of Fleet to Electric** from 2021 (see Appendix A).

Fleet Services is prepared to move forward with a planned Electric Vehicle (EV) transition program as recommended, but at the moment the City lacks the required charging infrastructure and EV charging network to support the electrification of the City's Fleet. The charging stations will have a significant impact on the City budget. There is a need for an EV plan/strategy to inform grant applications and development of an EV charging network, which may include chargers for both City and public use.

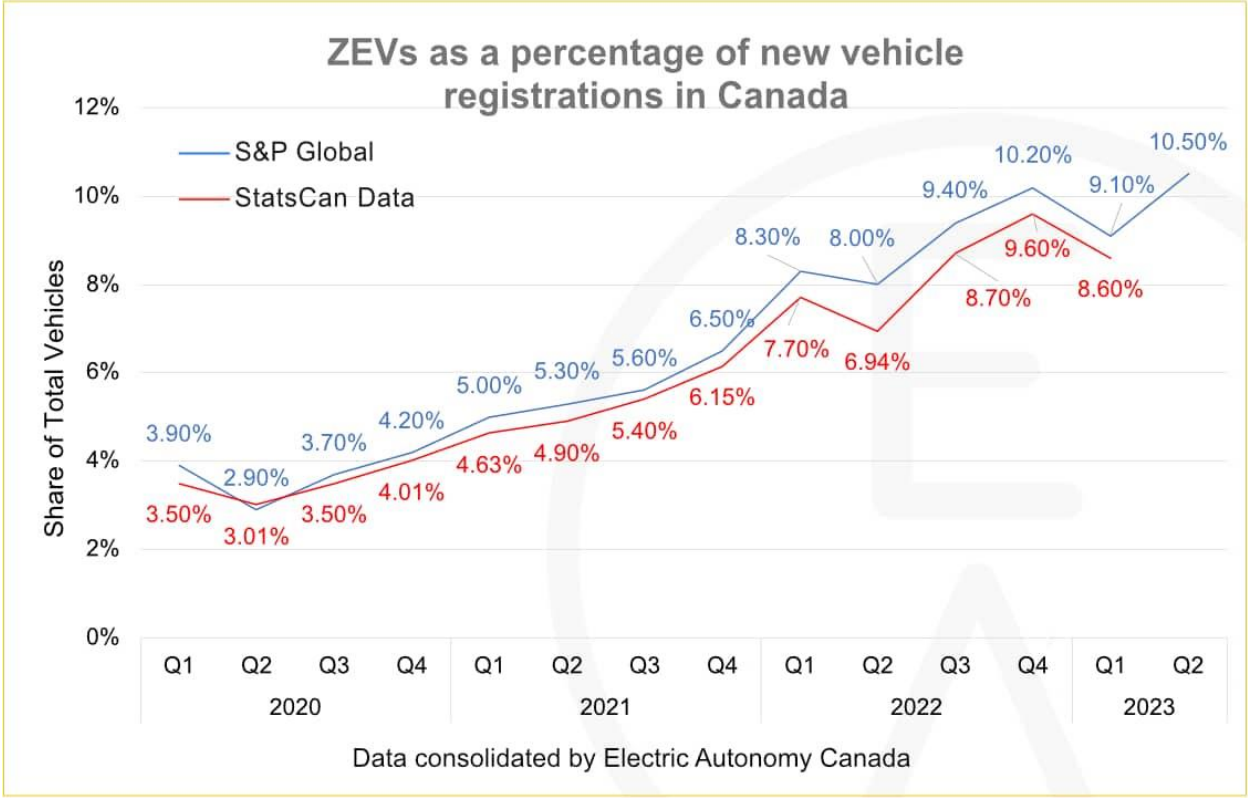
An internal EV working group has been established to review charging stations for both the City's internal fleet and also the potential to implement public chargers. The working group will focus on identifying appropriate locations and reviewing current building power capabilities and infrastructure. The working group will pursue all applicable grant funding in 2024, with additional budget recommendations to be included in 2025 budgets.

The main objective of the working group will be to establish and review optimal charging locations for implementation in 2025. The group will further prioritize locations for immediate and effective implementation of chargers for the City's fleet which will begin the EV transition. The current fleet plan may require adjustments to specific units and or operational divisions to coincide with charger availability/locations.

The working group will commit to a 2024 review which will trigger revisions to the implementation plan with a goal to report back to council in 2024. The updated implementation plan may identify the need for external expert resources and funding which will be requested as part of the report.

Rationale:

Timing is optimal for the City to consider Electric Vehicles (EVs) and EV charging implementation. The industry has now moved from being leading edge or new to main stream as EVs make up 9.6% of all passenger vehicles purchased in Canada for 2022 and is up from 6.2% in 2021. Brands and models are more readily available and capital costs are coming in line with their internal combustion engine counterparts.



In June of 2021, the Federal Government announced it would adopt requirements for 100% of passenger vehicle sales to be zero emissions or EVs by 2035 accelerating Canada's previous goal of 100% of sales by 2040.

The two main challenges for the City of Kawartha Lakes is the geographical size of our municipality and the existing charging station network, or the lack thereof. Without a robust charging network for both municipal and private EVs, uptake/transition can not efficiently progress.

Municipalities with large populations like the City of Toronto completed an Electrical Mobility Strategy in 2018 followed by an Electric Vehicle Strategy in 2019. Both were referenced and utilized as a resource in the original 2021 report.

https://www.toronto.ca/wp-content/uploads/2019/05/9685-EMS-Assessment-Phase-Final-Project-Report.pdf

https://www.toronto.ca/wp-content/uploads/2020/02/8c46-City-of-Toronto-Electric-Vehicle-Strategy.pdf

These important documents combined with the attached report can be utilized to move the City of Kawartha Lakes (City) forward into an EV and EV charging implementation plan. The City can reference and leverage the standards set and the expertise gained by some of our neighbouring municipalities that have already embarked on the EV journey. This will allow the City to accelerate the program and conserve resources and funds for implementation of the infrastructure.

Electric Vehicle Units

Fleet Services continues to monitor the EV market and its challenges and successes. Passenger Vehicle EVs more specifically Hybrid SUV's are a viable solution and option for the City of Kawartha Lakes and multiple divisions would have success with this type of unit. With hybrid vehicles it provides the benefits for emissions reduction and improved fuel economy while providing the division the operational flexibility to travel longer distances when required with little impact or delays to operations for charging. The City of Kawartha Lakes consists of a large geographical area and requires staff to travel great distances therefore making the hybrid solution the only EV viable option at this time.

Pricing and availability are monitored regularly and we have the ability to pivot and purchase EV units as soon as the City's charging network is available. Provided below are three (3) charts depicting Fleet's 7 Year Replacement Plan, 7 Year Potential EV Procurement Plan (with the understanding that the required charging infrastructure is already in place), 7 Year EV Division Locations & Potential Charging Need.

Updated from the 2021 Feasibility Plan:

7 Year Fleet Replacement Procurement									
Project Title	**Category**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Total**
Buses	Transit	1	3	1	2	1	1	1	10
Medium Duty Trucks	Fleet	2	1	2	1	1	0	2	9
Cars/Cross Over SUV	Fleet	3	3	0	0	0	3	1	10
Pick up Trucks	Fleet	9	3	0	0	3	8	10	33
Vans	Fleet	3	1	0	0	1	7	0	12
Grand Total		**18**	**11**	**3**	**3**	**6**	**19**	**14**	**74**

7 Year EV Fleet Procurement (Includes Additions to the Fleet)																
Project Title	**Category**	**2024**		**2025**		**2026**		**2027**		**2028**		**2029**		**2030**		**Total**
		ICE	**EV**	**ICE**	**EV**	**ICE**	**EV**	**ICE**	**EV**	**ICE**	**EV**	**ICE**	**EV**	**ICE**	**EV**	
Buses	Transit	1	-	3	-	1	-	2	-	1	-	1	-	1	-	10
Medium Duty Trucks	Fleet	2	-	1	-	2	-	1	-	1	-	-	-	2	-	9
Cars/Cross Over SUV	Fleet	-	5	-	3	-	-	0	-	-	0	-	3	-	1	12
Pick up Trucks	Fleet	15	-	3	-	-	-	0	-	3	-	8	-	10	-	39
Vans	Fleet	2	1	1	-	-	-	0	-	1	-	3	4	-	-	12
Total		**20**	**6**	**8**	**3**	**3**	**-**	**3**	**-**	**6**	**-**	**12**	**7**	**13**	**1**	**82**
Grand Total		**26**		**11**		**3**		**3**		**6**		**19**		**14**		**82**
Additional units added to fleet, based on divisional requests and business cases																

7 Year EV Division Locations & Potential Charging Need															
EV Divisions	**2024**		**2025**		**2026**		**2027**		**2028**		**2029**		**2030**		Office Location
	SUV	Van	SUV	Van	SUV	Van	SUV	Van	SUV	Van	SUV	Van	SUV	Van	
Human Services	1	-	-	-	-	-	-	-	-	-	-	-	-	-	68 Lindsay St N., Lindsay
By-Law	-	1	-	-	-	-	-	-	-	-	-	2	-	-	37 Lindsay Street South, Lindsay
Building Inspectors	4	-	3	-	-	-	-	-	-	-	3	-	-	-	180 Kent St. Lindsay and 9 Grandy Rd, Coboconk
Engineering	-	-	-	-	-	-	-	-	-	-	-	1	-	-	322 Kent St. Lindsay
Transit Admin	-	-	-	-	-	-	-	-	-	-	-	-	1	-	180 Kent St. Lindsay
IT	-	-	-	-	-	-	-	-	-	-	-	1	-	-	26 Francis St, Lindsay
Total	5	1	3	0	0	0	0	0	0	0	3	4	1	0	
Grand Total	6		3		0		0		0		7		1		

EV Charging Implementation Plan

As outlined in the 2021 Feasibility Plan, to support EV uptake both for the City's fleet and our community, a capital investment will be required. As a pilot or starting point, 20-40 ports should be considered. These chargers would support the proposed City

Fleet units outlined above. The capital investment would be between $300,000 and $750,000. This would allow for both level 2 and some level 3 charging stations. Decisions would need to be made on what portion of the charging infrastructure would be for City Fleet (private) and/or would be made available to the public.

For Council information, the City currently owns one public charging station located at the Lindsay Recreation Complex. Since 2017 it has generated a total of $13,450 (~$2,240 per year) in revenue and had usage totalling roughly 3,000 hours. The COVID years of 2021 and 2022 were of greater use, due to the pandemic and the lack of other public charging stations locations being in use and the Provincial shutdowns. 2023 is seeing the lowest use since 2017 inception and therefore the demand for this specific infrastructure at this location is not critical.

Please keep in mind the attached EV Implementation Plan is a high level plan that will require approval and refining but can be utilized as a starting point and step forward in the process. This plan will also impact the financial commitments of the Fleet Division as the initial capital cost of EVs is higher than that of gas powered vehicles. Also, transition to EVs cannot occur without timely and strategic capital investment in EV charging infrastructure. None of these incremental costs are currently included in the City's capital plan.

Hydrogen Fuel Cell & Hybrid Retrofits

Fleet Services has embarked on a Hydrogen Fuel Cell pilot program and to date it has produced promising results.

In 2021 the City's Fleet Services Division embarked on a pilot project with HYGN Energy Inc. to test and compile data for a new Hydrogen Fuel Cell technology utilized on conventional internal combustion engine vehicles. The pilot lasted 3-4 months and the units were installed on 1 x Winter Patrol ¾ Tonne Patrol Truck, 1 x Tandem Plow Truck and 1 x Conventional Transit Bus. The pilot program was promising and provided some valuable information. During the pilot the follow results were achieved. The ¾ Tonne Patrol Truck had an 89% emission reduction and 7% fuel savings, Tandem Plow Truck had a 69% emission reduction and 24% fuel savings and the Conventional Transit Bus had a fuel savings of 9%. Staff felt the results were favorable but there was a need to collect further information and data for a longer period of time prior to completing a business case for the implementation of Hydrogen Fuel Cell units on a larger volume of City owned vehicles.

The next phase of testing included the procurement and installation of five (5) hydrogen units. The goal was to collect a full year of data on various units with high annual kilometres traveled and units that consume high volumes of fuel. The five (5) hydrogen units would confirm the potential cost savings and emissions reduction while ensuring the units are robust enough to withstand a full season of winter control and roads operations. Five (5) units were procured and installed in the spring of 2023 and the data collection is approaching one year. The units were installed on the following categories and quantities:

Tandem Axle Plow Trucks x 2
Single Axle Plow Truck x 1
Conventional Transit Bus x 1
Pickup Truck Winter Patrol x 1

The emission reductions are as follows:
Tandem Axle Plow Trucks (1) 70% PPM CO Reduction
Tandem Axle Plow Trucks (2) 53% PPM CO Reduction
Single Axle Plow Truck 86% PPM CO Reduction

The Fuel Reductions are as follows:

Tandem Axle Plow Trucks Average Fuel Economy=	64.43 L/100km
Hydrogen Tandem Axle Plow Trucks (1) Average Fuel Economy=	51.29 L/100km
Hydrogen Tandem Axle Plow Trucks (2) Average Fuel Economy=	53.31 L/100km

Avg Reduction= 18.8%

Single Axle Plow Trucks Average Fuel Economy=	65.38 L/100km
Hydrogen Single Axle Plow Trucks Average Fuel Economy=	41.13 L/100km

Reduction= 37%

Bus Average Fuel Economy=	35.26 L/100km
Hydrogen Bus Average Fuel Economy=	33.93 L/100km

Reduction= 3.8 % Reduction

Pickup Trucks Average Fuel Economy=	17.69 L/100km
Hydrogen Pickup Trucks Average Fuel Economy=	17.05 L/100km

Reduction= 3.6% Reduction

The above results are promising but we also recognize that the data collected is a very small sample size. The next phase on the project is to install additional units in the same vehicle categories and continue to monitor and confirm results. Based on the data collected to date there is high potential for fuel and cost savings and combine that with

emissions reduction, this program may be an alternate fleet greening solution the City of Kawartha Lakes requires.

Technology

Hydrogen Technology Theoretically

- Reduces fuel consumption by up to 20%
- Reduces Carbon Monoxide Emission by up to 50%

How a Hydrogen Hybrid Works

1. The HYGN fuel system converts distilled water into Hydrogen, which is then introduced into the vehicle's air intake system.
2. This produces a more combustible and efficient fuel mixture, resulting in better range and less harmful emissions.

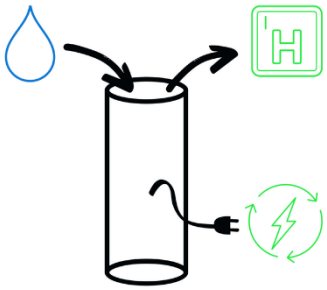
The HYGN system is compatible with gasoline and diesel engines

Working Towards Zero Emissions

- Not Everything Can Be Electrified
  - Existing vehicles that are difficult to electrify can be converted into hydrogen hybrids today
- Reaching Zero Emissions will take more than one solution
  - Some new vehicles can be fuel cell vehicles

Not All Hydrogen Is Equal

- No Rare Earth or Toxic Materials
- Circular Design Lasts Longer
- Hydrogen AND Oxygen Together
- Small Scale Electrolyzyer
- Average vehicle only requires water top-up once per month
- Virtually entirely recyclable



Safety First

HYGN Hydrogen Hybrid Safety Features:

- Hydrogen is only produced when the engine is running
- Hydrogen is never stored, and is never under pressure
- Safety signals will shut the system off if there is pressure, temperature, water leaking, or other reasons
- The very small amount of hydrogen is used right away

Other Alternatives Considered:

No alternatives were considered as this feasibility report is being provided in response to direction from Council.

Alignment to Strategic Priorities

1. Healthy Environment

Moving the City's fleet towards zero emission options and supporting the transition from fossil fuel Internal Combustion Engines (ICE) to EVs is directly in line with the City of Kawartha Lakes 2020-2023 Strategic plan. There is great cohesion with the City's vision and mission statements while aligning with our guiding principals and strategic priorities.

The increased uptake of electric vehicles is expected to make a significant contribution towards meeting emission reduction targets set out by both provincial and federal governments.

This report directly aligns with Healthy Environment in the below areas:

Implement the Healthy Environment Plan

- Execute the action plan with key partners and stakeholders

Develop and execute a Green City Charter, our corporate commitment to leadership in environmentally friendly business practices

- Reduce our corporate carbon footprint
- Create an efficient facility model
- Environmentally efficient municipal infrastructure
- Green procurement policy
- Green Fleet program and practices

2. A Vibrant and Growing Economy

Create an environment to attract business to Kawartha Lakes

- Support downtown revitalization to ensure our communities have a strong core
    - Placing charging infrastructure in our downtown cores will promote extended patronage by EV users

Enhance tourism

- Increase the visitor spend in Kawartha Lakes
    - Will naturally happen as EV users visit local business as charging takes place

Financial/Operation Impacts:

There are no immediate financial impacts from receiving this report as written. However, in order to implement an EV transition plan, there will be need for incremental financial commitments.

Consultations:

Chief Administrative Officer
Director, Corporate Services
Director, Community Services
Director of Engineering and Corporate Assets
Director of Public Works
Manager - Parks, Recreation & Culture
Manager, Corporate Assets
Manager, Technical Services
Manager, Building and Property

Attachments:

Appendix A –2021 Report- Feasibility Plan for the Transition of the City's Fleet to EVs

Feasibility Plan for the Transition of The (

Appendix B –2021 Report- Action Plan for EV and EV Charging Implementation

Action Plan And Deliverables.pdf

Department Head email: brobinson@kawarthalakes.ca

Department Head: Bryan Robinson, Director of Public Works