

Update on Electric Vehicle Strategy Implementation

Date: June 22, 2022

To: Infrastructure and Environment Committee

From: Executive Director, Environment and Energy Division

Wards: All

SUMMARY

This report provides a status update on the implementation of the Electric Vehicle (EV) Strategy approved by City Council in 2020. This report also discusses how the EV Strategy will need to align with the TransformTO Net Zero Strategy to support achieving City Council's updated goal that 30 per cent of registered vehicles in Toronto be electric by 2030.

The Electric Vehicle Strategy which was approved in 2020 aligned its actions to help the City achieve an overall goal for transportation of 100% of transportation using low-carbon energy sources by 2050 (TransformTO 2017). Since the climate emergency was declared, City Council's more recent adoption of TransformTO Net Zero Strategy increases the ambition for vehicle electrification, with an interim 2030 community-wide target that 30 per cent of registered vehicles in Toronto are electric. Because on-road transportation accounts for 35% of Toronto's greenhouse gas (GHG) emissions, transitioning away from fossil fuel-powered vehicles is critical for reaching a community-wide goal of net zero emissions by 2040.

To date, the implementation of the EV Strategy is largely on track, with numerous City-led initiatives underway to support and encourage the transition to EVs. This work is a cross-corporate endeavour, involving several City Divisions, Agencies, and Corporations, working individually and in collaboration with each other. The City's Electric Vehicle Working Group provides a focal point for coordination of EV-related activities.

Access to charging is a necessary condition for EV adoption and a critical focus of the City's EV-related work, including:

- Implementing requirements so that new buildings are future-proofed for EV charging;
- Providing funding and developing other approaches to support and encourage the retrofit of existing buildings with EV charging infrastructure;
- Providing publicly-accessible EV charging stations at on-street parking spaces, in Green P parking lots, and at City facilities; and

- Providing funding and undertaking planning and policy development to support additional deployment of public EV charging infrastructure.

The City is also fostering the transition to electric vehicles through outreach and education on EVs, leading by example through electrifying City Fleets, and supporting broader electric mobility.

The City is prioritizing the continued implementation of the Electric Vehicle Strategy, alignment of the EV Strategy with the Net Zero Strategy, and implementation of Net Zero Strategy Short-Term Implementation Plan actions related to EVs.

RECOMMENDATIONS

The Executive Director, Environment and Energy Division recommends that:

1. City Council receive this report for information.

FINANCIAL IMPACT

There are no financial impacts arising from the recommendation contained in this report.

EQUITY IMPACT STATEMENT

For households and businesses that need to use passenger vehicles, electric vehicles (EVs) offer several benefits over gasoline- and diesel-powered internal combustion engine (ICE) vehicles. EVs have lower fuel and maintenance costs, making EVs an affordable option. EVs do not have tailpipe emissions, so that as ICE vehicles are replaced by EVs, there will be a reduction in greenhouse gas (GHG) emissions and in local air pollution. Because EVs are much quieter than ICE vehicles, an electrified transportation system will reduce noise pollution.

However, EVs are only feasible for households that can afford to lease or own a personal vehicle, and that can afford to switch to an EV. While EVs tend to have a higher purchase price than equivalent gasoline- or diesel-powered vehicles, the Government of Canada's iZEV (Incentives for Zero-Emission Vehicles) program provides rebates of up to \$5,000 to help offset the higher purchase price of new EVs. Further, EV technology is maturing and the purchase price of new EVs is expected to reach parity with fossil fuel-powered vehicles between 2025 and 2028.¹ As the number of EVs increases, a second-hand EV market can develop, further reducing the cost of switching to an EV and making EVs financially feasible for more people.

Access to charging is a pre-requisite for having an EV. Charging at home is the most convenient option, but people may be able to charge at work if workplace charging

¹ Colin McKerracher. 2021. "The EV price gap narrows", Bloomberg NEF blog, June 25. <https://about.bnef.com/blog/the-ev-price-gap-narrows/>

stations are available or at publicly-accessible charging stations. People living in single family homes who can park their cars in driveways or garages can charge their EVs at home, provided that they can access a standard outlet, which will deliver Level 1 (slow) charging; EVs owners who can afford to do so may choose to invest in a faster Level 2 charger. People living in other kinds of housing or who do not have access to driveway or garage parking may have difficulty charging their EVs at home and may not have alternatives such as charging at work or at nearby public charging stations.

Toronto's Electric Vehicle Strategy outlines 10 actions across 4 areas of opportunity that the City can take to increase adoption of EVs in Toronto, including supporting the provision of home, workplace, and public EV charging. In developing and implementing policies, programs, and incentives to encourage and support the transition to EVs, it will be important to apply an equity lens to ensure that these measures do not have an adverse impact on equity, including equitable access to mobility.

It will also be important to ensure that measures to support EV uptake balance the use of personal vehicles and active transportation and transit. Toronto's Official Plan calls for "developing the key elements of the transportation system in a mutually supportive manner which prioritizes walking, cycling and transit over other passenger transportation modes" (Policy 2.2(4)(a)). These modes create fewer GHG and other emissions, result in less congestion, cost less to use than personal vehicles, and provide health benefits from increased physical activity.

DECISION HISTORY

On June 15, 2022, City Council received the staff report "On-Street Electric Vehicle Charging Stations - Pilot Conclusion and Next Steps," which provided details on the pilot and noted that 32 additional on-street public EV charging stations will be installed in 2022. City Council directed the Toronto Parking Authority to work with the General Manager, Transportation Services, Toronto Hydro and relevant stakeholders to install a minimum of 50 on-street electric vehicle chargers by the end of 2023.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2022.IE30.11>

On December 15, 16 and 17, 2021, City Council endorsed the targets and actions outlined in the TransformTO Net Zero Strategy and approved a target to reach net zero community-wide greenhouse gas emissions by 2040. The Net Zero Strategy includes a target that by 2030, 30 per cent of registered vehicles in Toronto are electric. The Net Zero Strategy's Short-Term Implementation Plan (2022-2025) includes actions to help ensure that Toronto is on track to meeting its 2030 and 2040 targets for EV adoption.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2021.IE26.16>

On June 8 and 9, 2021, City Council authorized the Toronto Atmospheric Fund to receive \$2 million from Natural Resources Canada's Zero Emission Vehicle Infrastructure Program and requested the Toronto Atmospheric Fund to provide quarterly reports to the Infrastructure and Environment Committee.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2021.EX24.5>

On January 29, 2020, City Council approved the Electric Vehicle (EV) Strategy which identifies 10 actions across four areas of opportunity that the City can take to support a transition to electric personal vehicles. City Council directed the Director, Environment and Energy, in consultation with relevant City Divisions, to report back to the Infrastructure and Environment Committee with a status update on the progress of the immediate actions identified in the Electric Vehicle Strategy starting in the second quarter of 2021 that includes projected impacts on the personal vehicle fleet size resulting from all TransformTO transportation measures and the impacts on the electricity grid as well as the outcome of activity exploration and targets and timelines for expanded deployment of on-street electric vehicle charging infrastructure.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2020.IE11.17>

COMMENTS

This report provides an overview and status update on City-led initiatives to support the transition to electric vehicles in Toronto. This work is primarily guided by the Electric Vehicle (EV) Strategy that was approved by City Council in January, 2020.² Support for vehicle electrification is a cross-corporate endeavour with several City Divisions, Agencies, and Corporations working individually and in collaboration on a wide range of initiatives.

Background

Current status of EV uptake

Table 1 shows the number of passenger EVs and the total number of passenger vehicles registered in Toronto for each year between 2018 and 2020.³ While the share of EVs has increased each year, EVs are still only a small fraction of total passenger vehicles registered in Toronto.

Table 1: Number of registered passenger vehicles in Toronto (2018-2020)

	2018	2019	2020
Passenger EVs	6,345	7,914	10,643
Total passenger vehicles	1,141,585	1,162,034	1,106,618
EV share	0.6%	0.7%	1.0%

Figures 1 and 2 show the distribution of EV ownership in Toronto in 2018 and 2020. The distribution has not changed significantly between 2018 and 2020. Figure 3 shows the distribution of EV ownership (the grey dots) in 2020 and median household income by census tract from the 2016 census.⁴ As shown in Figure 3, EV ownership tends to

² <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2020.IE11.17>

³ Data in Table 1 and Figures 1-3 are from the Ontario Ministry of Transportation.

⁴ EV registration data in Figure 3 is the same as the data in Figure 2; median household income by census tract is from the 2016 Census.

concentrate in neighbourhoods with higher incomes. As discussed in the Equity Impact Statement of this report, there are opportunities to improve equitable access to EVs and EV charging infrastructure.

Figure 1: EV Ownership in 2018

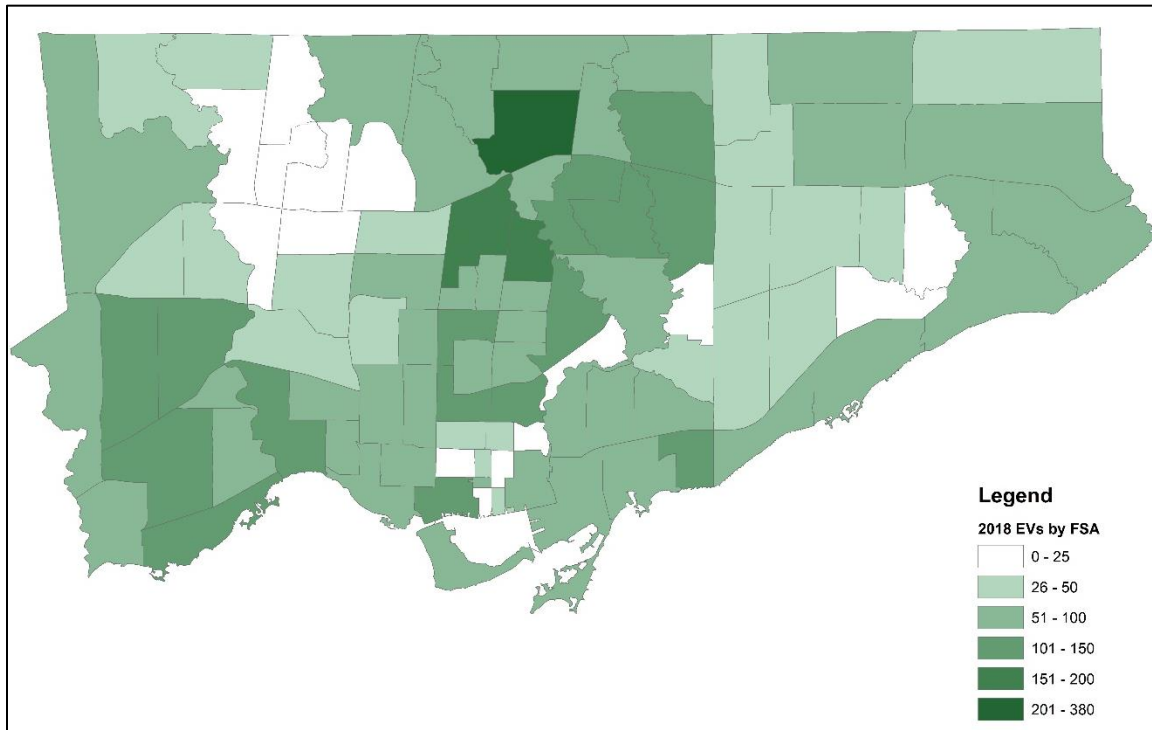


Figure 2: EV Ownership in 2020

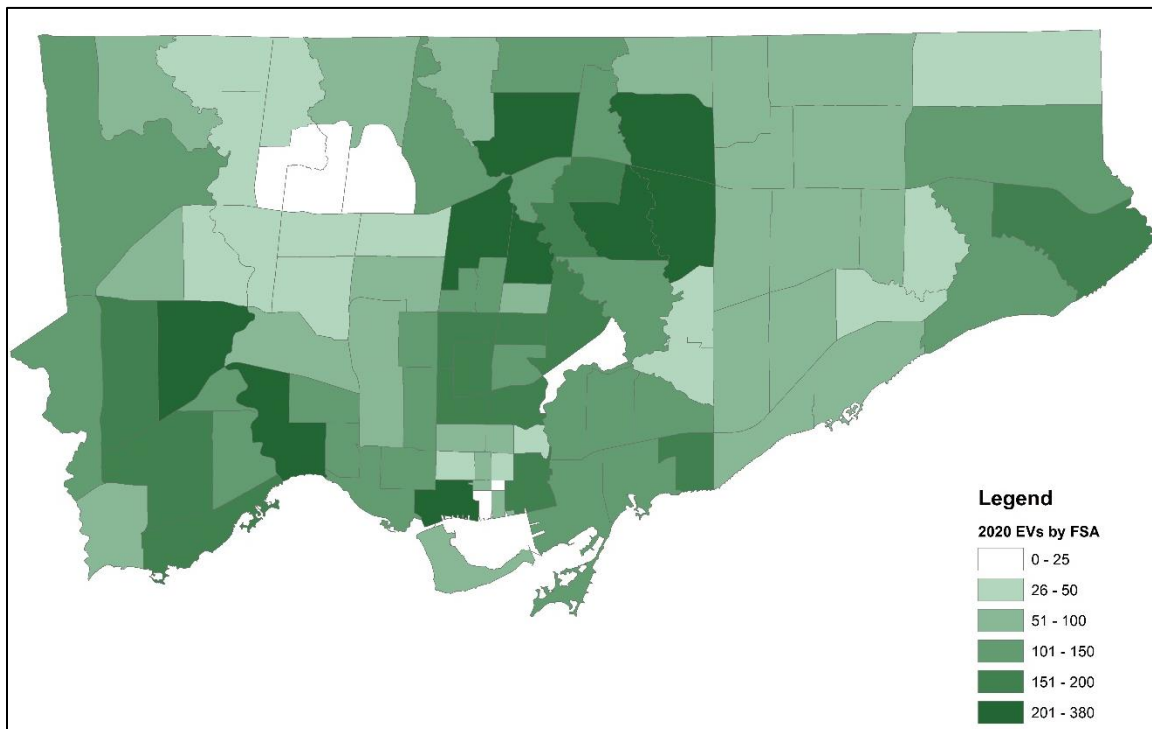
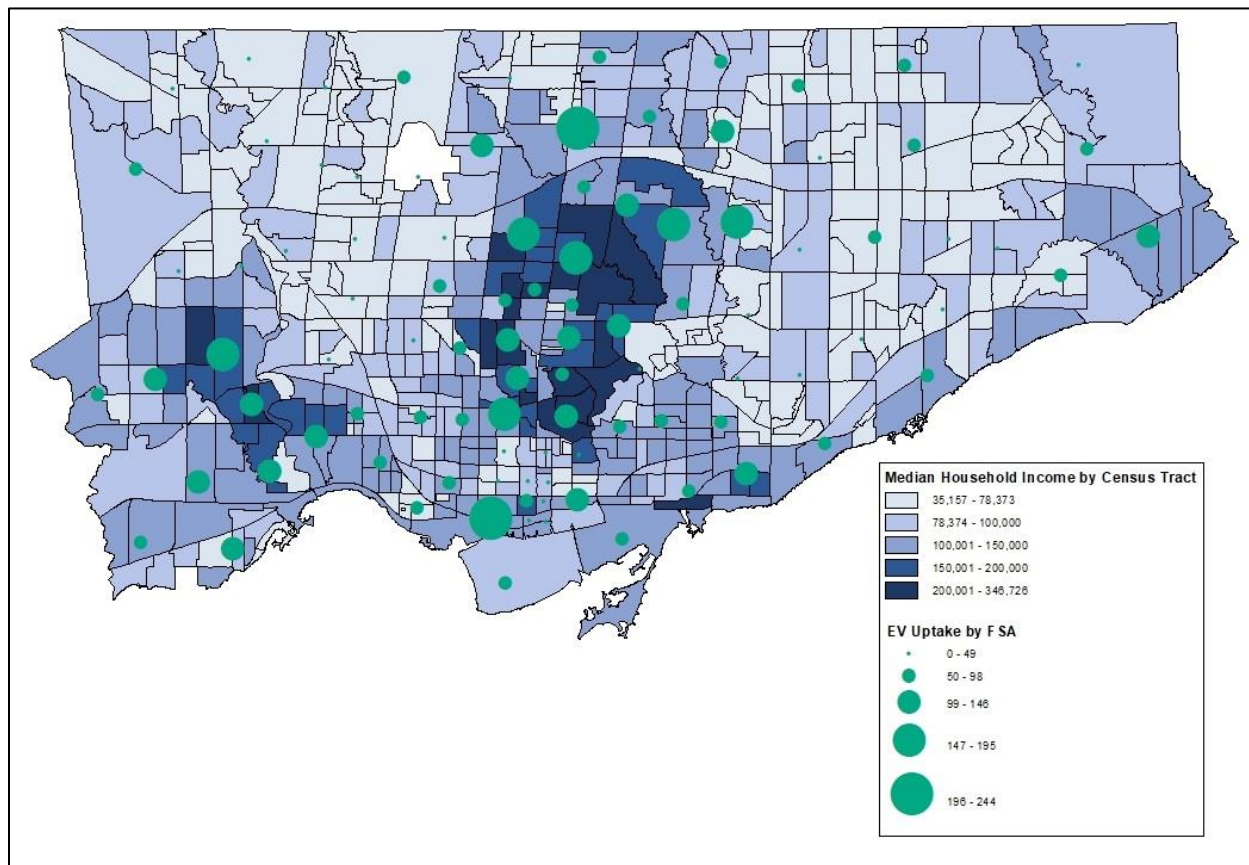


Figure 3: EV Registrations and Household Income



In 2020, 2.4% of new vehicles registered in Toronto were EVs, compared to 10.9% in Vancouver and 8.0% in Montreal.⁵ There were similar shares at the provincial level, with EVs being 1.8% of total new vehicle registrations in Ontario, 8.4% in B.C. and 6.8% in Quebec.⁶

Provincial and federal government policies and investments

In evaluating the success of the City's efforts to support vehicle electrification, it is important to recognize that federal and provincial government policies and investments play a key role, as do decisions taken by the private sector. As noted in the EV Strategy:

The City cannot transform the personal vehicle market on its own. It will take consistent, dedicated partners in the Greater Toronto Area and at higher levels of government working together in order to achieve a transition to 100% zero emission vehicles.

The growth of EVs in Quebec and British Columbia is supported by Zero Emission Vehicle (ZEV) mandates in those provinces as well as EV incentive programs offering

5 Statistics Canada, "Zero-emission vehicle registrations down slightly in 2020." The Daily, Apr. 22, 2021. <https://www150.statcan.gc.ca/n1/daily-quotidien/210422/dq210422e-eng.htm>

6 Ibid.

rebates for the purchase of new EVs and for installing residential EV charging infrastructure.⁷ In addition, Quebec offers rebates for purchase of used EVs and British Columbia has a "scrap-it" program and offers rebates for workplace charging.⁸ Ontario does not have a provincial ZEV mandate or a provincial EV incentive program, although the Clean Air Partnership and Plug'n Drive offer a \$1,000 rebate for purchase of a used EV and another \$1,000 if the purchaser scraps their gas-powered car.⁹ The Ontario government provides support for EVs through the Green Licence Plate Program, which allows EVs to use provincial HOV lanes; reserved parking spaces for EVs; emissions testing for heavy diesel commercial motor vehicles; and investments in Ontario's automotive sector to support EV manufacturing.¹⁰

The federal government will develop a light duty vehicle (LDV) ZEV sales mandate, which will set annually increasing requirements towards achieving 100% LDV ZEV sales by 2035, including mandatory interim targets of at least 20% of all new LDVs offered for sale by 2026 and at least 60% by 2030.¹¹ The federal government will also "launch an integrated strategy to reduce emissions from medium-and heavy-duty vehicles (MHDVs) with the aim of reaching 35% of total MHDV sales being ZEVs by 2030 [and] develop a MHDV ZEV regulation to require 100% MHDV sales to be ZEVs by 2040 for a subset of vehicle types based on feasibility, with interim 2030 regulated sales requirements that would vary for different vehicle categories based on feasibility, and explore interim targets for the mid-2020s."¹²

The federal government offers a rebate of up to \$5,000 for purchase of new EVs. In the recent 2030 Emission Reductions Plan (ERP), the federal government has extended this program to 2025. The 2030 ERP also provides additional funding for EV charging infrastructure, a new incentive program for electric MHDVs, funding to retrofit large trucks, and funding for hydrogen trucking demonstration projects.¹³

Key Toronto Strategies regarding EVs

Two City-wide strategies, the EV Strategy (2020) and the newly adopted Net Zero Strategy (2021), guide the City's actions to support the transition to electric vehicles.

1) Electric Vehicle Strategy

The Electric Vehicle Strategy identifies specific actions that the City of Toronto is taking to encourage and support Toronto residents, commuters, and businesses to switch from

7 See for instance Electric Mobility Canada's "Information and Recommendations for ECCC on its 2022 ZEV Consultation: Achieving a Zero-Emission Future for Light-duty Vehicles". January 21, 2022. <https://emc-mec.ca/wp-content/uploads/2022-EMC-recommendations-for-ECCC-on-LDV-ZEV-consultation-Eng.pdf> or Jason Tchir, 2021. "Why do B.C. and Quebec get new EVs before other provinces?" Globe and Mail, December 6. <https://www.theglobeandmail.com/drive/mobility/article-why-do-bc-and-quebec-get-new-evs-before-other-provinces/>

8 <https://www.plugndrive.ca/electric-vehicle-incentives/>

9 <https://www.plugndrive.ca/used-electric-vehicles-incentive/>

10 <https://www.ontario.ca/page/low-carbon-vehicles-and-electric-vehicles>

11 Government of Canada, 2030 Emission Reductions Plan. 2022.

<https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/erp/Canada-2030-Emissions-Reduction-Plan-eng.pdf>

12 Ibid. p. 61.

13 Ibid.

gasoline- and diesel-powered vehicles to electric vehicles. The Strategy focuses on passenger vehicles (cars, vans, trucks, and SUVs), and includes 10 actions the City will take to:

- Increase charging availability;
- Address cost and convenience barriers;
- Increase public awareness and education; and
- Create economic opportunities that will benefit the local economy.

2) Net Zero Strategy

In December 2021, City Council adopted the TransformTO Net Zero Strategy which sets a new target for community-wide greenhouse gas (GHG) emissions in Toronto to be net zero by 2040 – 10 years earlier than initially proposed.¹⁴

Because on-road transportation accounts for 35% of Toronto’s GHG emissions, reducing the emissions from vehicles is critical for achieving Toronto’s net zero goal. Reflecting this, the Net Zero Strategy identifies transportation electrification as one of five critical steps to reduce GHG emissions.

Successful implementation of the EV Strategy will help achieve the Net Zero Strategy’s goals for transportation electrification, but the scope of implementation will need to be strengthened. In addition, the Net Zero Strategy’s Short-Term Implementation Plan (2022-2025)¹⁵ includes actions that augment the EV Strategy to help ensure that Toronto is on track to meeting its 2030 and 2040 targets for EV adoption (discussed in the next section). Alignment of the EV Strategy with the Net Zero Strategy and the additional actions outlined in the Short-Term Implementation Plan (2022-2025) are discussed on pages 16-17 of this report.

Targets for EV adoption

To help achieve net zero GHG emissions by 2040, the Net Zero Strategy calls for an accelerated pace of EV adoption. This is reflected in an updated 2030 target for EV adoption, as shown in Table 2.

It is important to recognize that in 2020 EVs were less than 1% of registered personal vehicles in Toronto. In less than 10 years, this share must increase to 30% of all registered vehicles to meet the Net Zero Strategy 2030 target.

The opportunity for increasing EV uptake is at the point of vehicle stock turn over. If on average people replace their vehicles every ten years,¹⁶ it will take ten years for the total vehicle stock to turn over. This means that, even if every new vehicle purchased is an EV, it would still take almost ten years for the total vehicle stock in Toronto to be converted to 100% EVs. It is clear that in order to meet the Net Zero Strategy targets for

14 <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2021.IE26.16>

15 <https://www.toronto.ca/legdocs/mmis/2021/ie/bgrd/backgroundfile-173757.pdf>

16 The average age of passenger vehicles in Ontario is nine years. DesRosiers Automotive Consultants, 2021. *CADA Year in Review 2020*. p. 82.

<https://www.nxtbook.com/dawson/desrosiers/cada2020/index.php>

EV adoption, EVs will need to be a much larger proportion of vehicle purchases than they currently are.

Table 2: Targets for Adoption of Electric Vehicles

Target date	Electric Vehicle Strategy: share of EVs in registered personal vehicles	Net Zero Strategy: Share of EVs in registered vehicles
2025	5%	5%
2030	20%	30%
2040	80%	100% ¹⁷
2050	100%	

EV Strategy Implementation Status Update

To support the transition to electric transportation, several City Divisions, Agencies, and Corporations are working individually and in collaboration on a wide range of initiatives. The Electric Vehicle Working Group (EVWG), which was established in 2009, provides a forum for cross-corporate coordination of initiatives related to EVs. The EVWG led the development of the EV Strategy and is now focused on its implementation. The Working Group meets quarterly and is coordinated by Environment and Energy Division.

Members of the EVWG include:

- City Planning
- Economic Development and Culture Division
- Environment and Energy Division
- Fleet Services
- Municipal Licensing & Standards
- The Atmospheric Fund
- Toronto Hydro
- Toronto Parking Authority
- Toronto Transit Commission
- Transportation Services

In general, EV Strategy implementation is on track. Most of the EV Strategy actions with an “Immediate” timeline are underway, with the exception of exploration of financial and other options to support EV charging infrastructure (actions 1.1, 1.2, 1.3, and 2.2). With the additional resources now available in Environment and Energy Division, these

¹⁷ While a target of 100% EV adoption by 2040 was not formally adopted by City Council, a shift to 100% net zero transportation is implied by the overall target of net zero emissions by 2040. This shift will be supported by the federal requirement that by 2035, all new light duty vehicles sold in Canada will need to be zero emission vehicles.

actions will be undertaken over the coming 1-2 years. It is not anticipated that this delay will materially affect the timeline for the transition to EVs in Toronto.

Most of the Near-Term (2021-2023) actions in the EV Strategy are also either underway or planned for the next 1-2 years. The exception is action 9.2: Explore opportunities to avoid waste and support end-of-life reuse. While this action is not currently in the workplan for the coming 1-2 years, staff will take advantage of opportunities to pursue this topic as they arise.

Additionally, work has begun on a Medium-Term (2024-2027) action: Toronto Hydro is proceeding with two initiatives exploring the enablement of renewable energy and grid optimization (action 3).

Attachment 1 to this report provides details on the implementation status of each of the actions in the EV Strategy.

Key Performance Indicators

The EV Strategy includes key performance indicators (KPIs) for each action and for strategy implementation overall. Environment and Energy Division will work in collaboration with other members of the EV Working Group to populate these KPIs for inclusion in the next EV Strategy implementation status update report.

Highlights of Current City Initiatives

The following section provides an overview of key City initiatives to support the transition to electric vehicles. More detail on these initiatives is provided in Attachment 1.

EV charging

Access to charging is essential for EV uptake. There are three kinds of EV charging stations (more formally referred to as Electrical Vehicle Supply Equipment or EVSE), with progressively faster charging and more electricity use from Level 1 to Level 3. Table 3 compares the different kinds of EV charging systems.

EV drivers charge their vehicles at home, at work, or at public EV charging stations, depending on what charging opportunities are available. The City is undertaking significant work to ensure sufficient home, workplace, and public charging opportunities will be available to support a rapid transition to electric vehicles.

Home and Workplace Charging

The most convenient place to charge an EV is at home or at work, and more than 80% of EV owners charge their vehicles at home. Therefore access to charging at home or work is most important for EV adoption. The City has implemented requirements to ensure that new buildings will be future-proofed with the infrastructure needed to support EV charging. The City is also pursuing a variety of approaches to support retrofitting of existing buildings with EV charging infrastructure. City initiatives in support of home and workplace EV charging are discussed in more detail in Attachment 1.

Table 3: Electric Vehicle Charging Systems

	Level 1 (AC)	Level 2 (AC)	Level 3 or DCFC
Typical Output	1.5 kW (120 Volts)	7.2 kW (240 Volts)	50 kW – 350 kW (400 to 800 Volts)
Range added per hour (approximate)	8 km	40 km	300+ km
Equipment and installation costs	\$150 - \$1,500	\$5,000 - \$10,000	\$50,000 - \$200,000
Typical use locations	Homes, workplaces, public places	Some homes, workplaces, public places	Major corridors, public spaces

Public EV Charging

While most current EV owners charge their vehicles at home or at work, public EV charging is also important to support increased adoption.¹⁸ Public EV charging provides charging opportunities for EV drivers enroute and helps to alleviate range anxiety, the fear of running out of charge before reaching the next charging opportunity – the more public charging stations available, the less range anxiety an EV owner will feel.

Public EV charging also provides charging for EV owners who do not have access to charging at home or work, sometimes referred to as “garage orphans”. This is important in Toronto, where about 65% of households live in apartment buildings.¹⁹ Retrofitting to provide EV charging for all apartment residents who wish to use an EV may not be feasible in some buildings. Additionally, other Toronto residents do not have access to a driveway or a garage where they could charge their EV. As discussed in the EV Station Fund Report for Q1 2022 (in Attachment 2 to this report), early experience with the EV Station Fund – funded by Natural Resources Canada – has reinforced the substantial need for more extensive charging infrastructure throughout Toronto, and that this need is most acute for garage orphans.

Recognizing the importance of public EV charging for the transition to electric vehicles, the EV Strategy has targets for provision of publicly-accessible EV charging in 2025 and 2030. To align with the increased ambition in the Net Zero Strategy, these targets may need to be increased. Table 4 shows the EV Strategy targets for publicly-accessible EV charging stations and an estimate of what those targets would need to be to support an

18 Public EV charging means EV charging that is publicly accessible, and that may or may not be provided by a public body.

19 Statistics Canada 2021 Census, Household and dwelling characteristics for Toronto, City [Census subdivision].

increase in the number of EVs from 20% to 30% of registered personal vehicles by 2030.²⁰

Table 4: Targets for publicly-accessible EV charging stations (number of ports)

	2025	2030
EV Strategy		
DCFC	220	650
Level 2	3,000	10,000
New Net Zero Alignment Goal		
DCFC	220	1,000
Level 2	3,000	15,000
Targets for EV uptake		
EV Strategy: share of registered personal vehicles	5%	20%
Net Zero Strategy: share of registered vehicles		30%
Assumed EVs/port		
DCFC	270	330
Level 2	20	22

The EV Strategy’s public charging targets were calculated using assumed standards for the number of charging station ports per EV, in 2025 and 2030, which are shown in Table 4.²¹ Based on the same standards, the 2030 target for publicly-accessible

20 The Net Zero Strategy’s target for 2030 is that 30% of all registered vehicles will be EVs. The estimated increase in charging stations in Table 4 was calculated proportionately to an increase from 20% to 30% of registered personal vehicles only.

21 As noted in the EV Strategy (footnote 25, page 14): “[The targets] are based on Dunsky’s EV Adoption model, which incorporates research into optimal EV-to-charge port ratios. While near-term infrastructure planning often focuses on a need to establish geographic coverage, the capacity of the infrastructure must increase as the EV population grows over time to avoid congestion.

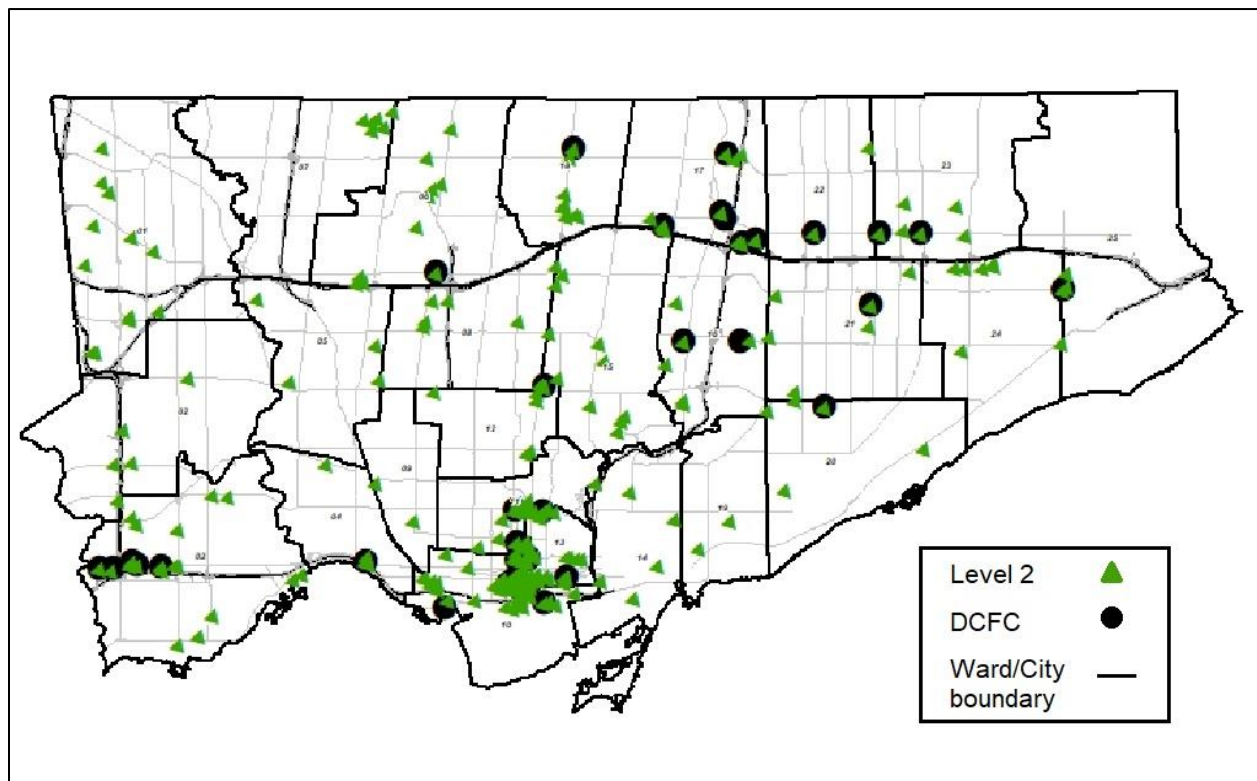
“The resulting EV-to-charge port ratios are that by 2025, there will be 270 EVs to DCFC port and 20 EVs to L2 port; whereas by 2030, the ratios will have increased to 330 EVs to DCFC port and 22 EVs to L2 port.

“It is important to note that these ratios are aligned to the estimated needs in other metropolitan areas in the United States, where the average ratios in 2025 across 50 such areas is estimated as 256 EVs to DCFC port and 15 EVs to L2 port; or when comparing with specific metropolitan areas that are predicted to have a similar number of EVs as the City of Toronto, such as Chicago (234 EVs to DCFC port and 17 EVs to L2 port) or Sacramento (345 EVs to DCFC port and 17 EVs to L2 port).”

charging stations would need to be 50% higher to support the Net Zero Strategy target of 30% vehicles being electric by 2030.

There are currently 1,348 publicly-accessible charging stations in Toronto, including 116 DCFC and 1,232 Level 2 charging stations.²² Figure 4 shows publicly-accessible EV charging stations in Toronto, as of April 2022.

Figure 4: Publicly-accessible EV Charging Stations in Toronto, April 2022



Meeting the Net Zero Strategy targets for EV uptake will require a massive increase in public EV infrastructure from what is currently available. Provision of public EV charging infrastructure – either directly or by supporting others to do so – is an area in which the City can substantially support the transition to EVs and is a strong focus of City efforts related to EVs.

Deployment of public EV charging infrastructure

The City has a key role in providing public EV charging infrastructure in Toronto, including at on-street parking spaces, in Green P lots, and at City facilities. Activities related to public EV charging infrastructure are coordinated through a working group composed of Environment and Energy Division, Fleet Services, Toronto Hydro, Toronto Parking Authority, and Transportation Services.

²² Data provided by Mogile Technologies to the City of Toronto. These totals include Tesla charging stations. Excluding Tesla charging stations, there are 1,031 public EV charging stations including 40 DCFC and 991 Level 2 charging stations.

Environment and Energy Division is the overall lead on public EV charging, with responsibility for enabling sufficient public EV charging infrastructure to support the City's targets for EV uptake. Transportation Services in collaboration with Toronto Hydro installed the current 17 on-street public EV charging stations and expect to install an additional 32 on-street charging stations in 2022, with funding support from The Atmospheric Fund and Energy and Environment Division and project execution support from Toronto Hydro.²³

Toronto Parking Authority (TPA) is responsible for installing and operating EV charging stations at TPA's off-street parking facilities and beginning in Q2 2023 will be responsible for all of the City's on-street charging stations. TPA plans to install over 500 EV charging stations by the end of 2024 at its off-street parking locations, and City Council has directed TPA to install a minimum of 50 additional on-street public EV charging stations before the end of 2023.²⁴

Fleet Services is responsible for the development and management of the City's corporate EV charging network that will enable and support accelerated transition of City Fleets to zero emission vehicles. The network will also enable the expansion of the City's workplace charging program, and will be made accessible to public where feasible.

City-provided public EV charging versus EV Strategy targets

Table 5 summarizes the current and planned future installation of public EV charging infrastructure in Toronto. According to current plans and City Council direction, there will be 166 City-provided public EV charging stations by the end of 2022, 361 by the end of 2023, and 658 by the end of 2024. There are currently 1,322 public charging stations in Toronto in addition to the ones provided by the City. Assuming that only the City increases the number of public charging stations over time (i.e., that no one else installs additional public charging), there will be 1,479 public charging stations by the end of 2022 and 1,980 by 2024, which is about two-thirds of the 2025 target in the EV Strategy for publicly-accessible Level 2 charging stations. The City's corporate EV charging network may supplement the City's planned provision of public EV charging stations, but at this time it is not known how many of the City's corporate EV charging stations will be available for public use.

Details on the City's current and planned deployment of public EV charging infrastructure are provided in Attachment 1.

Other City-led support for public EV charging

In addition to directly providing public EV charging infrastructure, the City is supporting public EV charging by providing funding for public EV charging infrastructure via the EV Station Fund, planning for the long-term deployment of public EV charging and developing a City-wide Parking Strategy. In response to City Council's request for

²³ Details are in "On-Street Electric Vehicle Charging Stations - Pilot Conclusion and Next Steps", item 2022.IEC30.11: <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2022.IE30.11>

²⁴ Part 3 of <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2022.IE30.11>

quarterly updates on the EV Station Fund,²⁵ the Q1 2022 report is provided in Attachment 2 to this report.

Table 5: Current and Planned Public EV Charging Stations

Installation Year	Number of charging ports
2022 On-street installed	17
2022 on-street planned	32
2022 TPA off-street installed	9
2022 TPA off-street planned	108
Subtotal 2022	166
2023 TPA on-street planned (minimum)	50
2023 TPA off-street planned	145
Subtotal 2023	195
2024 TPA on-street planned (minimum)	50
2024 TPA off-street planned	247
Subtotal 2024	297
Current non-City EV charging ports	1,322
Subtotal (without expected increase)	1,322
Total estimated in 2024 (as of June 2022)	1,980
2025 Target	3,220
2030 Target	16,000

25 Part 2 of <http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2021.EX24.5>

To provide the detailed information needed to support future deployment of public EV charging across Toronto, the City is developing a Public EV Charging Infrastructure Plan. The Plan will determine specifically where public EV charging will be needed in Toronto between 2023 and 2040 and will identify locations where this infrastructure might be provided. This information will be used by the City in planning investments in public EV charging infrastructure, and could be used by other providers to plan their own investments. Recognizing that the scale of public EV charging infrastructure required is beyond the capacity of the City to provide on its own, the Plan will also identify and evaluate different models for investment in and ongoing operation of this infrastructure.

The Plan will be developed over 2022, with target completion in Q2 2023. The Plan will draw on work already underway, including the on-street charging program and TPA's deployment plans for EV charging services, and will involve extensive public and stakeholder engagement. The Plan will also integrate with relevant initiatives currently underway, including the City-wide Parking Strategy and the development of by-law updates and complementary programs to achieve the vehicle electrification targets that were approved by City Council in December 2021. Details are provided in Attachment 1.

Other City initiatives to increase EV uptake

In addition to working to ensure there will be sufficient EV charging infrastructure to support a large scale transition to EVs, the City is also working to increase awareness and understanding about EVs, leading the way by electrifying City fleets, and supporting broader electric mobility. Details on these initiatives are provided in Attachment 1. Additionally, Toronto Hydro's Climate Action Plan outlines how Toronto Hydro could support the City's Net Zero Strategy and, among other issues, increase the uptake of EVs.

Alignment of the EV Strategy with the Net Zero Strategy

Implementation of the EV Strategy will help to achieve the City's GHG emission and EV uptake goals, but the EV Strategy will need to be aligned to the Net Zero Strategy. The accelerated pace of EV adoption reflected in the new Net Zero Strategy targets may suggest that implementation of the EV Strategy should also be accelerated. However, many of the EV Strategy's actions, particularly those most crucial for EV uptake such as access to EV charging, are currently being implemented or will be implemented in 2023. In other words, many of the EV Strategy's actions already match the accelerated schedule.

Alignment of the EV Strategy to the Net Zero Strategy will occur by strengthening the scope of EV Strategy implementation as needed to support the accelerated target for EV uptake in 2030. EV Strategy initiatives will be designed to support the new 2030 EV target, rather than the target that is in the EV Strategy. For instance, City initiatives to support provision of home, workplace, and public EV charging will aim to enable sufficient charging infrastructure to support growth in EV ownership to 30% of registered vehicles by 2030.

The City will conduct a comprehensive review of the Electric Vehicle Strategy in 2024-2025, which will identify any areas in which the EV Strategy or its implementation should be strengthened, changed, or expanded to support the Net Zero Strategy 2030 target.

To achieve the Net Zero Strategy's goals for transportation electrification, additional actions are needed which go beyond the scope of the EV Strategy. These actions, which are in the Net Zero Strategy's 2022-2025 Short-Term Implementation Plan, include:

- Identifying ways to support personal or shared EV adoption in order to reduce the use of gas and diesel vehicles;
- Encouraging the use of e-bikes and EVs for last-mile deliveries; and
- Encouraging adoption of electric commercial and freight vehicles.

Projected impacts on personal vehicle fleet size and on the electricity grid

When City Council approved the EV Strategy, they directed the Director of Environment and Energy Division, in consultation with relevant City Stakeholders, "to report back to the Infrastructure and Environment Committee with a status update on the progress of the immediate actions identified in the Electric Vehicle Strategy starting in the second quarter of 2021 that includes projected impacts on the personal vehicle fleet size resulting from all TransformTO transportation measures and the impacts on the electricity grid".²⁶

Attachment 1 to this report provides the status update requested by City Council;²⁷ this section discusses the projected impacts on the personal vehicle fleet size resulting from all TransformTO transportation measures and the impacts on the electricity grid.

Projected impacts on personal vehicle fleet size

In support of preparation of the Net Zero Strategy, the City undertook modeling to explore pathways to reach net zero GHG emissions by 2040 and 2050.²⁸ Figure 5 shows the projected number of personal vehicles under the Business-As-Planned (BAP)²⁹ and Net Zero by 2040 (NZ40) scenarios.

The number of personal vehicles is the same in both scenarios and rises over time.³⁰ The difference is that the share of EVs increases much faster in the Net Zero by 2040 scenario, reaching 100% by 2040.

26 Part 3 of Council Decision for item 2020.IE11.17:

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2020.IE11.17>

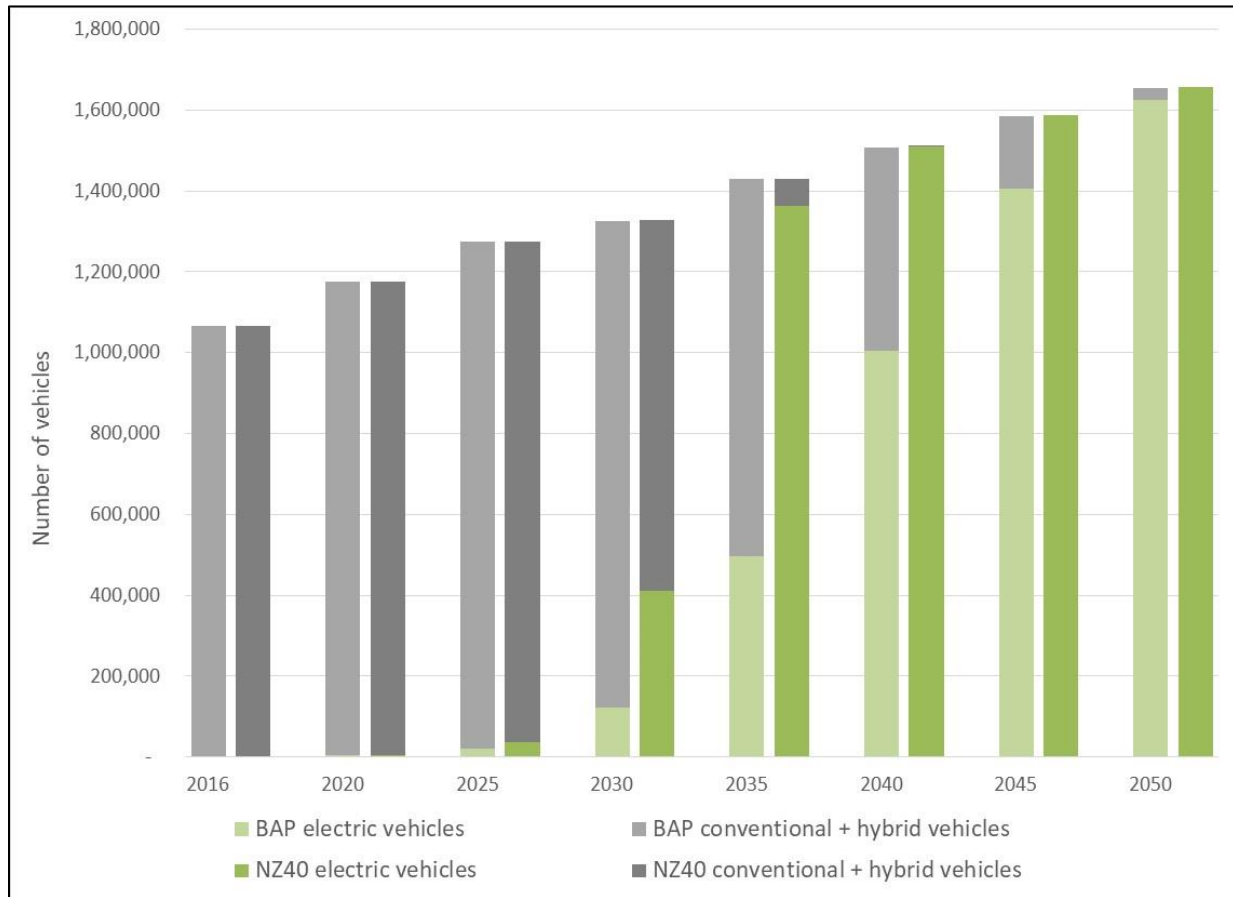
27 The status update report was not provided until now due to staffing constraints.

28 The TransformTO Net Zero Framework Technical Report provides details on the modeling: <https://www.toronto.ca/legdocs/mmis/2021/ie/bgrd/backgroundfile-173759.pdf>. Technical modelling results can be viewed on the CityInSight dashboard: <https://cis-community.ssg.coop/toronto/emissions>.

29 The Business as Planned (BAP) scenario evaluates the impacts of currently planned policies and actions.

30 This is because the number of personal vehicles is assumed to increase in proportion to the number of households.

Figure 5: Modeled Personal Vehicle Stock Under Different Net Zero Strategy Scenarios



While Net Zero Strategy modeling does not show a decrease in the total number of vehicles, it does show a shift in trips from personal vehicles to active transportation and transit: the share of trips by personal vehicle falls from 63% (in 2016) to 47% by 2030 and 32% by 2040. Table 6 shows the share of trips by mode in the Net Zero by 2040 scenario.

Table 6: Mode Shares In the Net Zero by 2040 Scenario (Percentage of Trips)

2016	2025	2030	2040
Bike/e-bike: 4%	Bike/e-bike: 8%	Bike/e-bike: 14%	Bike/e-bike: 23%
Walk: 9%	Walk: 13%	Walk: 16%	Walk: 23%
Transit: 25%	Transit: 26%	Transit: 24%	Transit: 22%
Vehicle: 63%	Vehicle: 54%	Vehicle: 47%	Vehicle: 32%

The shift in mode shares and the shift to electric vehicles are reflected in the two 2030 Transportation goals in the Net Zero Strategy:

- 30 per cent of registered vehicles in Toronto are electric
- 75 per cent of school/work trips under 5km are walked, biked or by transit

The model underscores that the combined effect of displacing vehicle trips from fossil fuel based travel to cycling, walking and transit with any remaining trips converted to electric vehicles as being critical to reaching net zero emissions by 2040.

Projected impacts on the electricity grid

To date, the limited number of EVs in Toronto has not had a significant impact on the electricity distribution grid. However, as EVs proliferate and charging stations become more common, substantial investments in the electricity grid will be required to accommodate this new demand. To meet the targets set out in the City's Net Zero Strategy, and as outlined in their Climate Action Plan, Toronto Hydro expects it will need to invest up to \$10 billion in infrastructure by 2040 to support electrification from EVs and other sources. Toronto Hydro will refine its forecast and provide a more detailed grid investment plan based on anticipated localized load increases as part of its next rate application.

The success of the shift to EVs in reducing Toronto's GHG emissions is predicated on the availability of sufficient low carbon electricity to meet the fueling needs of a large number of EVs. Canada's 2030 Emission Reductions Plan notes that:

The phase-out of unabated fossil fuel-fired electricity generation and increased demand for electricity in other parts of the economy, such as space heating and on-road transportation, will lead to a significant increase in demand for non-emitting electricity. Multiple reports have estimated that, by 2050, Canada will require two to three times the current generating capacity.³¹

Switching from the use of personal vehicles in favour of active transportation and transit is a GHG emission reduction strategy that is less reliant on the availability of low carbon electricity³² and which is less costly for users, reduces congestion, and offers health benefits from increased physical activity.

Conclusion and next steps

With on-road transportation accounting for 35% of Toronto's GHG emissions, transitioning to electric vehicles is critical for achieving TransformTO GHG emission reduction targets. The accelerated goal in the Net Zero Strategy for uptake of EVs – 30% of registered vehicles by 2030 – means that the scope of EV Strategy implementation will need to be strengthened accordingly, and that additional actions will need to be pursued, as detailed in the Net Zero Strategy's 2022-2025 Short-Term Implementation Plan.

31 Government of Canada, 2030 Emission Reductions Plan. 2022. P. 40.

<https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/erp/Canada-2030-Emissions-Reduction-Plan-eng.pdf>

32 Electric buses will require access to electricity, as will electric micro-mobility devices such as e-bikes.

The City is undertaking numerous initiatives to support the transition to electric vehicles, with several City Divisions, Agencies, and Corporations working individually and in collaboration with each other on the various initiatives. The cross-corporate EV Working Group serves as a focal point for coordination of the City's EV-related activities.

In general, implementation of the EV Strategy is on-track. Implementation of most "Immediate" actions is underway; exploration of financial and other options to support EV charging infrastructure has been delayed but with the additional resources now available in Environment and Energy Division, these actions will be undertaken over the coming 1-2 years. Similarly, implementation of most Near-Term (2021-2023) actions is either underway or planned for the next 1-2 years. Environment and Energy Division, in collaboration with members of the EV Working Group, will populate the EV Strategy's Key Performance Indicators to include in the next EV Strategy implementation status update report.

EV charging – which is critical to EV adoption – is a strong focus of the City's EV-related work, with several initiatives underway to support deployment of this infrastructure, including:

- Mandating EV-ready new construction and supporting the development industry to meet EV charging requirements;
- Supporting and encouraging the provision of EV charging in existing buildings; and
- Cross-corporate, coordinated work to help ensure that sufficient public EV charging will be in place.

The City is also undertaking an EV Outreach Initiative to increase awareness and understanding about EVs, leading by example through electrification of City Fleets, and undertaking several initiatives to support broader electric mobility.

The priority for the next three years will be the actions specified in the Net Zero Strategy 2022-2025 Short-Term Implementation Plan. Environment and Energy Division, in consultation with other relevant Divisions, Agencies, and Corporations, will continue to monitor EV Strategy implementation.

Staff expect to be bringing to City Council more specific information on how the City can support the transition to electric vehicles, starting in 2023, based on activities undertaken in 2022 including development of the Public EV Charging Infrastructure Plan, extension of the on-street EV charging program, and exploration of options the City can pursue to support and encourage provision of EV charging in existing buildings and more generally support the transition to EVs.

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ATTACHMENTS

Attachment 1: Detailed Status Report on Electric Vehicle Strategy Implementation
Attachment 2: EV Station Fund - Report for Q1 2022