



Seasonal Prohibition on Lithium-Ion Battery Powered E-Bikes and E-Scooters

Date: October 29, 2024

To: TTC Board

From: Chief Safety Officer

Chief Strategy and Customer Experience Officer

Summary

This report provides an update on the TTC's electric bicycle (e-bike) and electric scooter (e-scooter) policies in response to a Board motion requesting a review of regulations implemented in comparable jurisdictions. The motion specifically sought recommendations on how to protect fire safety on public transit in relation to customers' electric micromobility devices, given increasing concerns over lithium battery hazards and the size of these devices, following the December 31, 2023 e-bike lithium-ion battery fire incident on Line 1.

While supporting micromobility aligns with City goals, including reducing traffic congestion, encouraging sustainable transportation, and contributing to local economic development, the TTC's primary concern is safety for customers and employees.

Due to the current lack of regulation and safety concerns surrounding e-bikes, e-scooters, and the lithium-ion batteries that power them, it is recommended that the TTC prohibit these devices across the transit system during the winter season from November 15 to April 15 of each year. The primary safety concerns are fire risks associated with the lithium-ion batteries found in these devices, particularly those uncertified or misused. Fluctuating temperatures can cause condensation and lithium plating, increasing the likelihood of short circuits and fires. The difficulty in verifying battery integrity and exposure to road conditions, such as salt or de-icing compounds during winter, further heightens these risks.

Recommendations

It is recommended that the TTC Board:

1. Approve the prohibition of lithium-ion-powered micromobility devices, including e-bikes and e-scooters, onboard TTC vehicles and inside TTC stations and facilities from November 15 to April 15 each year.
2. Forward this report to Transport Canada and the City of Toronto for information.

Financial Summary

Costs for signage across the system and a communications campaign can be accommodated within the TTC's 2024 Operating Budget. Any future incremental costs, should they be necessary, will be considered in future budget submissions.

There may be a small financial impact due to reduced ridership by e-bike and e-scooter riders who will not be permitted to bring their micromobility vehicles onto the TTC during the winter months; however, this impact is unknown at this time.

The Chief Financial Officer has reviewed this report and agrees with the financial impact information.

Equity/Accessibility Matters

The TTC strongly believes that all customers should enjoy the freedom, independence, and flexibility to travel anywhere on its transit system and across the City. The TTC's commitment to providing accessible transit is at the forefront of its 2024-2028 Corporate Plan, including the key principles of Equity, Diversity, Inclusion, and Accessibility.

The recommendations and next steps outlined in this report will maintain the current access for people travelling with non-electric bicycles on the TTC in accordance with TTC By-law No. 1. However, e-bikes and e-scooters would be prohibited at all times during the winter season from November 15 to April 15 onboard TTC vehicles, and inside TTC subway stations and facilities.

Some customers, including those who use e-bikes and e-scooters for employment purposes, may be impacted by prohibiting these devices on the TTC. Some of the alternate options available for customers include:

- Bicycle parking, at or near entrances to all 70 subway stations.
- Bicycle lockers, at seven subway stations, several GO Transit stations, and Civic Centre locations.
- Bike Share Toronto, located in close proximity to most subway stations.

It is important to note that no restrictions have been or will be placed on electric wheelchairs or other mobility devices used by people with disabilities, some of which are powered by lithium-ion batteries. These devices are always permitted on the TTC with the stipulation that they must be powered off with the brakes applied once positioned in the Priority Seating area onboard TTC vehicles.

Decision History

At its January 25, 2024 meeting, the [TTC Board adopted a motion](#) directing staff, in consultation with City of Toronto Municipal Licensing and Standards, Toronto Fire Services, Toronto Professional Firefighters Association, TTC unions, and a representative from CycleTO to review and report back on regulations implemented in

comparable jurisdictions in Canada and internationally, with recommendations on protecting fire safety on public transit in relation to customers' electric micromobility devices, including e-bikes.

At its May 22, 2024 meeting, City Council adopted [A Micromobility Strategy for Toronto](#) that outlines key policy goals for the strategy and criteria by which new micromobility opportunities are assessed, including safety, mobility, the environment, equity and inclusion, health and public health, economic vitality, costs and liability. The strategy specifically recommended that the City continue to decline to opt into the Province's e-scooter pilot program. The strategy recommended that the City advance areas of action, including shared micromobility integration with public transit and broad education on fire safety for lithium-ion batteries used in micromobility devices.

Issue Background

On December 31, 2023, an e-bike powered by a lithium-ion battery caught fire onboard a Line 1 subway train approaching Sheppard-Yonge Station. Toronto Fire Services quickly responded and extinguished the fire while Toronto Paramedic Services transported three people with injuries to the hospital. There was minor damage to the subway car involved in the incident.

Following the incident, the following actions were taken:

Root Cause Analysis of the Incident

The investigation by Toronto Fire Services indicated that the fire was the result of the failure of the lithium-ion battery that powered the e-bike involved in the incident. The lithium-ion battery within the e-bike went through "thermal runaway", which then led to the bike components catching fire. Conversations were held with the manufacturer and the distributor of the e-bike. The manufacturer advised that their e-bikes were not intended to be used in adverse weather conditions. According to the manufacturer's manual and warranty, this includes operating their e-bikes where snow, ice, or road salt is present. With a temperature of +1 Celsius on the day of the incident, roadways on which the e-bike travelled prior to the incident may have been brined with salt.

TTC and City Policy Review

A review of current TTC and City of Toronto bicycle policies was undertaken.

Bicycles are not permitted on TTC property when they may inconvenience other passengers during peak hours due to crowding. Currently, bicycles may be brought onboard TTC streetcars and subway trains, and into TTC stations outside of peak hours from Monday to Friday before 6:30 a.m., between 10 a.m. and 3:30 p.m., and after 7 p.m., as well as all day weekend and statutory holidays. These are times when the TTC plans for fewer standees aboard vehicles. Bicycles may also be brought onboard buses during these times if the exterior bicycle rack is full, and space is available onboard. Notwithstanding the above, the TTC has advised customers and Bus Operators that e-bikes are not permitted on bus bicycle racks due to their weight and because they often do not fit properly due to their larger dimensions and tires.

As an agency of the City of Toronto, the TTC is subject to and supports the City of Toronto's Micromobility Strategy. The goals of the Micromobility Strategy aim to (among other things) enhance and expand the use of mobility options that are smaller, lighter, and have lower emissions for connections to public transit, increase the mode share of active and public transit, prevent negative equity and inclusion impacts, and support economic vitality by enhancing affordability of travel. TTC's bicycle policies support the micromobility strategy.

Regulatory Environment

The operation of e-bikes and e-scooters is regulated by Provincial legislation and the City of Toronto. Under the Ontario Highway Traffic Act (HTA), e-bikes are generally subject to the same requirements as non-electric bicycles with additional requirements for helmet use, maximum speed and weight, minimum wheel dimensions, and braking system requirements. E-scooters are subject to the requirements of the Electric Kick-style Scooter Pilot (E-Scooter Pilot) under the HTA.

The Toronto Municipal Code governs where e-bikes are permitted to be operated, which varies depending on the type of e-bike. Generally, e-bikes are permitted to be operated on roadways and cycle lanes, but the operation of larger e-bikes is restricted from use on multi-use trails and cycle tracks. The operation of e-scooters is prohibited on roads, sidewalks, and trails in Toronto, and the city has declined to opt into the E-Scooter Pilot for various safety and liability-related reasons.

Neither Provincial nor municipal laws contain requirements for, or prohibitions on, e-bike or e-scooter carriage on public transit vehicles.

Lithium-ion batteries power most e-bikes and e-scooters. However, there are no Federal, Provincial, or Municipal requirements for standard certification of e-bikes, e-scooters, or their batteries.

E-bike Regulations Jurisdictional Scan

Staff conducted an international peer review of e-bike and e-scooter policies at transit agencies that operate rapid transit, including outreach to more than 20 transit agencies directly or via industry associations, including the International Association of Public Transport (UITP), American Public Transit Association (APTA) and Community of Metros (CoMET). The review found varying and inconsistent approaches to integrating electric micromobility devices. While many transit agencies have established guidelines for bicycles on transit, few have dedicated policies for emerging micromobility modes, such as e-bikes and e-scooters.

In the Greater Toronto Area, Metrolinx updated its policy in April 2024 to include a requirement for e-bike lithium-ion batteries to meet Underwriters Laboratories (UL) or Conformité Européenne (CE) requirements without any physical damage to the battery or warranty seal. This new policy involves GO Transit staff inspecting all e-bikes and affixing tamper-proof seals to e-bikes that meet the lithium-ion battery requirements.

Several transit agencies, including Ottawa (OC Transpo), Washington (WMATA), Bay Area Rapid Transit (BART), Berlin U-Bahn, Buenos Aires Metro, Sao Paulo Metro, Lisbon Metro, Paris Metro and RER, and Istanbul have extended their existing bicycle

policies to encompass electric micromobility devices. These extensions include restrictions regarding the permitted time of use, modes, routes and lines, and apply uniformly to both motorized and non-motorized micromobility devices.

Conversely, some transit agencies, such as Boston (MBTA), Delhi Metro, and Brussels (STIB) have implemented outright permanent or temporary bans on all electric micromobility devices, with exceptions for accessibility devices. Others, such as Sydney Transport NSW, Metro de Madrid, Newcastle Tyne & Wear Metro, and Transport for London align with local road traffic laws where e-scooters are not permitted on their respective transit systems, but e-bikes are allowed.

Policies vary considerably for transit agencies permitting electric micromobility devices. A common requirement is for these devices to be powered off during transit, with prohibitions on charging and usage while on public transit. Many transit agencies also specify restrictions based on weight and dimensions. For example, Montreal (STM), Chicago (CTA), and Los Angeles Metro allow e-bikes on trains but not on buses due to incompatibility with bicycle racks. Generally, foldable micromobility devices, both motorized and non-motorized, are allowed onboard all vehicles at most transit agencies as long as they remain folded.

Shared fleet bicycles are a notable exception. Most transit agencies do not allow shared bicycles (e.g. Bike Share Toronto) on public transit, regardless of whether they are e-bikes or non-electric bicycles. However, Bike Share Toronto advises that its e-bikes use certified components, are well-maintained, and have not been involved in any kind of fire incident.

No policies were found regarding the commercial use of e-bikes. Policies generally relate to the size of the e-bike, not the use case (e.g. recreational use, food delivery/commercial use, etc.).

A detailed comparison of the North American Transit Agency peer review of e-bike and e-scooter policies is available in Attachment 1.

Lithium-Ion Battery Incident Response Equipment Scan

After reviewing several new technologies for responding to suspected lithium-ion battery fires and mitigating associated risks, staff have determined that implementing specialized fire equipment will not enhance safety on TTC vehicles. The reviewed specialized equipment included lithium-ion fire-rated extinguishers and blankets.

Considering the volatile and short-lived nature of lithium-ion fires in relation to the size of the batteries that can be brought onto the system, it has been concluded that prioritizing the evacuation from the area rather than attempting to extinguish the fire is the safest approach. It is also important to note that the interior of the vehicles are constructed primarily of non-combustible materials, with fire retardants used on fabrics and plastics to ensure that fire cannot easily spread. While the TTC remains committed to exploring new technology for the TTC system and facilities, the current assessment suggests that alternative safety measures should be prioritized in response to lithium-ion fire incidents.

Customer Relations Review

The TTC reviewed bicycle policy-related feedback received through the Customer Service Centre over the past two years and for the first several months of 2024.

In 2022 and 2023, 52 complaints were received about the use of e-bikes in stations and onboard trains. The majority of these complaints were related to lack of peak hour enforcement and crowding concerns.

Over the first nine months of 2024, more than 70 complaints were received about use of e-bikes in stations and onboard trains, along with another 13 complaints about e-scooter use. All of these complaints requested that the TTC either ban e-bikes from the transit system or enforce peak hour restrictions.

Communications to Customers and Employees

A communications campaign was developed in 2024 to remind customers when bicycles and e-bikes are allowed on the system. This campaign included a platform video screen and station announcements, along with information notices for Stations staff to hand to customers entering the system with a bike or e-bike.

Safety awareness notices were also issued to all TTC employees, reminding them of the current bicycle policies in Toronto and onboard the TTC, tips about lithium-ion batteries, and instructions on how to report customer violations of the policies.

Consultation

TTC staff have had discussions with various stakeholders and agencies, including TTC unions (ATU 113 and Local 5089), City of Toronto staff, Toronto Fire Services, Cycle Toronto, and Metrolinx, all of whom provided input that the TTC considered in development of the new policy direction recommended in this report.

Comments

E-Bike Usage on the TTC

The TTC supports an integrated mobility system that makes getting around the city and the region as easy as possible without using a private vehicle. Use of e-bikes in Toronto has become widespread over the past several years, especially during and emerging from the COVID-19 pandemic. In particular, e-bikes are now widely used by couriers delivering food and other items and can be seen around Toronto at all hours of the day, including on the TTC system.

During the pandemic, allowing bicycles onboard subway trains, including during peak periods, was generally not a concern as ample capacity was available. However, as ridership has returned and service adjustments have been made to better match capacity with demand, space for bicycles onboard TTC vehicles is generally no longer available during peak periods. Furthermore, e-bikes are typically larger than non-electric bicycles, especially when equipped with delivery bags and take up the same amount of room as several standing customers, leading to numerous customer complaints over the past several years, as noted above.

Bicycle usage counts undertaken throughout 2024 as part of elevator usage counts have found that bicycles and e-bikes are currently prevalent on the TTC at all hours of the day. Bicycle usage peaks during the late afternoon and early evening from 3:30 p.m. to 7 p.m., with the number of non-electric bicycles and e-bikes at the highest count from 6:30 a.m. to 3:30 p.m.

E-Bike and E-Scooter Fire Safety Concerns

E-bikes, e-scooters, and the lithium-ion batteries that power them, have been found to pose a fire safety risk, especially during the winter months of the year. The primary safety concerns include the following:

- **Fire Risk:** Lithium-ion batteries, commonly used in e-bikes and e-scooters, can present a fire risk, particularly if the batteries are uncertified and/or not used as recommended by the manufacturer. Incidents with these larger and more powerful batteries found in these devices can be more severe and the fires harder to extinguish. We know this risk increases with temperature fluctuations and road conditions during winter months.
- **Temperature Fluctuations:** Moving lithium-ion batteries from cold to warm environments can lead to condensation and lithium plating, both of which increase the risk of short circuits, fires, and explosions. This is especially true with uncertified after-market batteries.
- **Battery Integrity:** There is no efficient way to verify whether the batteries in e-bikes and e-scooters have been damaged, tampered with, altered, or replaced with non-certified components, which adds to the risk.
- **Road Conditions:** According to manufacturers, e-bikes are not to be operated where the battery compartment could come in contact with salt or de-icing compounds, both of which are used during cold/winter months.

Next Steps

Opportunities have been identified to refine the TTC's policy requirements to increase safety and provide additional clarity for TTC customers and staff as to which devices are and are not permitted onboard TTC vehicles and inside TTC stations and facilities.

TTC staff recommend prohibiting operating, charging, or transporting e-bikes and e-scooters on TTC property and bringing them onboard TTC vehicles during the winter season, from November 15 to April 15. This is as a result of the fire safety danger that lithium-ion batteries pose, especially during the winter months, as noted above. The TTC will post signage throughout the system, under By-law No. 1, to implement the prohibition and carry out a communications plan to notify and educate the public and customers of the prohibition. TTC staff will monitor the effects of the seasonal ban on e-bikes and e-scooters on the transit system and report back to the Board if further adjustments are recommended. Staff will also monitor usage of bike parking at TTC stations and recommend adjustments if required.

Adopting the same e-bike requirements as Metrolinx was considered, however, this was ruled out. With customers using e-bikes to access TTC services throughout the day via 70 subway stations across the city, including many unstaffed entrances, it would not be practical or feasible to implement a battery inspection initiative without adding significant new staffing resources.

The TTC will continue to work with Toronto Fire Services and the City of Toronto to implement a safety campaign regarding lithium-ion batteries on our system. The messaging will focus on the dangers that lithium-ion batteries pose (specifically large batteries found in e-scooters and e-bikes) and how to maintain the highest level of safety with regards to the micromobility devices once the ban is lifted in the spring.

In addition to the ban on e-bikes and e-scooters during the winter season, the TTC will renew efforts to enforce the existing policy that prohibits all non-electric bicycles and large objects on TTC vehicles during peak periods where they may inconvenience other customers. This will involve empowering frontline staff to intervene and educate customers about the policy, with warnings and fines as a last resort.

It is also recommended that the TTC support City-led advocacy efforts for the Federal government to regulate micromobility vehicle and lithium-ion battery safety requirements, standards, testing and labelling, as recommended in the City's Micromobility Strategy.

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Attachments

Attachment 1 – Summary of E-bike Regulations Jurisdictional Scan

Attachment 1 – Summary of E-bike Regulations Jurisdictional Scan

Agency	Mode	E-Bikes		E-Scooters
		<i>E-bike requiring pedaling ("pedelecs" under 40 kg)</i>	<i>E-bike requiring pedaling ("pedelecs" over 40 kg)</i>	<i>Personal electric scooters</i>
BART San Francisco	Rail	✓ (except crowded and first car)	✓ (except crowded and first car)	✓ (if foldable)
	Bus Exterior	n/a	n/a	n/a
	Bus Interior	n/a	n/a	n/a
Calgary Transit Calgary	Rail	✓ (at certain times)	✓ (at certain times)	✗
	Bus Exterior	✓ (if designed as such and <75lbs)	✗	✗
	Bus Interior	✗	✗	✗
CTA Chicago	Rail	✓	✓	✓
	Bus Exterior	✗	✗	✗
	Bus Interior	✗ (unless it is foldable)	✗ (unless it is foldable)	✗
GO Transit GTHA	Rail	✓ (at certain times)	-	✓ (if foldable)
	Bus Exterior	✓ (<25kg)	✗	-
	Bus Interior	✗	✗	✓ (if foldable)
MBTA Boston	Rail	✗ ("no motorized vehicles")	✗ ("no motorized vehicles")	✗
	Bus Exterior	-	-	-
	Bus Interior	✗	✗	-

Agency	Mode	E-Bikes		E-Scooters
		<i>E-bike requiring pedaling ("pedelecs" under 40 kg)</i>	<i>E-bike requiring pedaling ("pedelecs" over 40 kg)</i>	<i>Personal electric scooters</i>
Metro Los Angeles	Rail	✓ (if similar size to regular bike)	✗	-
	Bus Exterior	✗	✗	-
	Bus Interior	✗ (unless it is foldable)	✗	-
Metro Transit Minneapolis	Rail	✓	✓	✓
	Bus Exterior	✓	✓ (if <55 lbs.)	✗
	Bus Interior	Operator's discretion	Operator's discretion	✓ (if foldable)
MTA New York	Rail	✓ (at certain times/days)	✓ (at certain times/days)	✓ (at certain times/days)
	Bus Exterior	✓ (if designed as such)	✓ (if designed as such)	-
	Bus Interior	✗ (unless it is foldable)	✗ (unless it is foldable)	✓ (must be folded)
NJ Transit New Jersey	Rail	✓ (at certain times/days/lines)	✓ (at certain times/days/lines)	✓ (at certain times/days/lines)
	Bus Exterior	✓ (rack or underfloor luggage)	✓ (rack or underfloor luggage)	✓ (rack or underfloor luggage)
	Bus Interior			✗
SEPTA Philadelphia	Rail	✓ (at certain times/days/lines)	-	✓ (at certain times/days/lines)
	Bus Exterior	✗	✗	-
	Bus Interior	-	-	-

Agency	Mode	E-Bikes		E-Scooters
		<i>E-bike requiring pedaling ("pedelecs" under 40 kg)</i>	<i>E-bike requiring pedaling ("pedelecs" over 40 kg)</i>	<i>Personal electric scooters</i>
STM Montreal	Rail	✓ (at certain times)	✓ (at certain times)	✓ (at certain times)
	Bus Exterior	✗	✗	✗
	Bus Interior	✗ (unless it is foldable)	✗ (unless it is foldable)	✗ (unless it is foldable)
Translink Vancouver	Rail	✓ (at certain times, <73" long)	✓ (at certain times, <73" long)	-
	Bus Exterior	✓ (<25kg, remove battery)	✗	✗
	Bus Interior	✗	✗	-
WMATA Washington	Rail	✓ (< 80" long, 48" high, 22" wide)	✓ (< 80" long, 48" high, 22" wide)	✓ (< 80" long, 48" high, 22" wide)
	Bus Exterior	✓ (< 80" long, 48" high, 22" wide)	✓ (< 80" long, 48" high, 22" wide)	-
	Bus Interior	-	-	-

Information not available is indicated with "-"