Toronto's Industry Growth Roadmap for the Sustainable Transportation Sector

Image: View of the downtown Toronto skyline at dusk.

TORONTO
Economic Development & Culture

FORESIGHT CANADA

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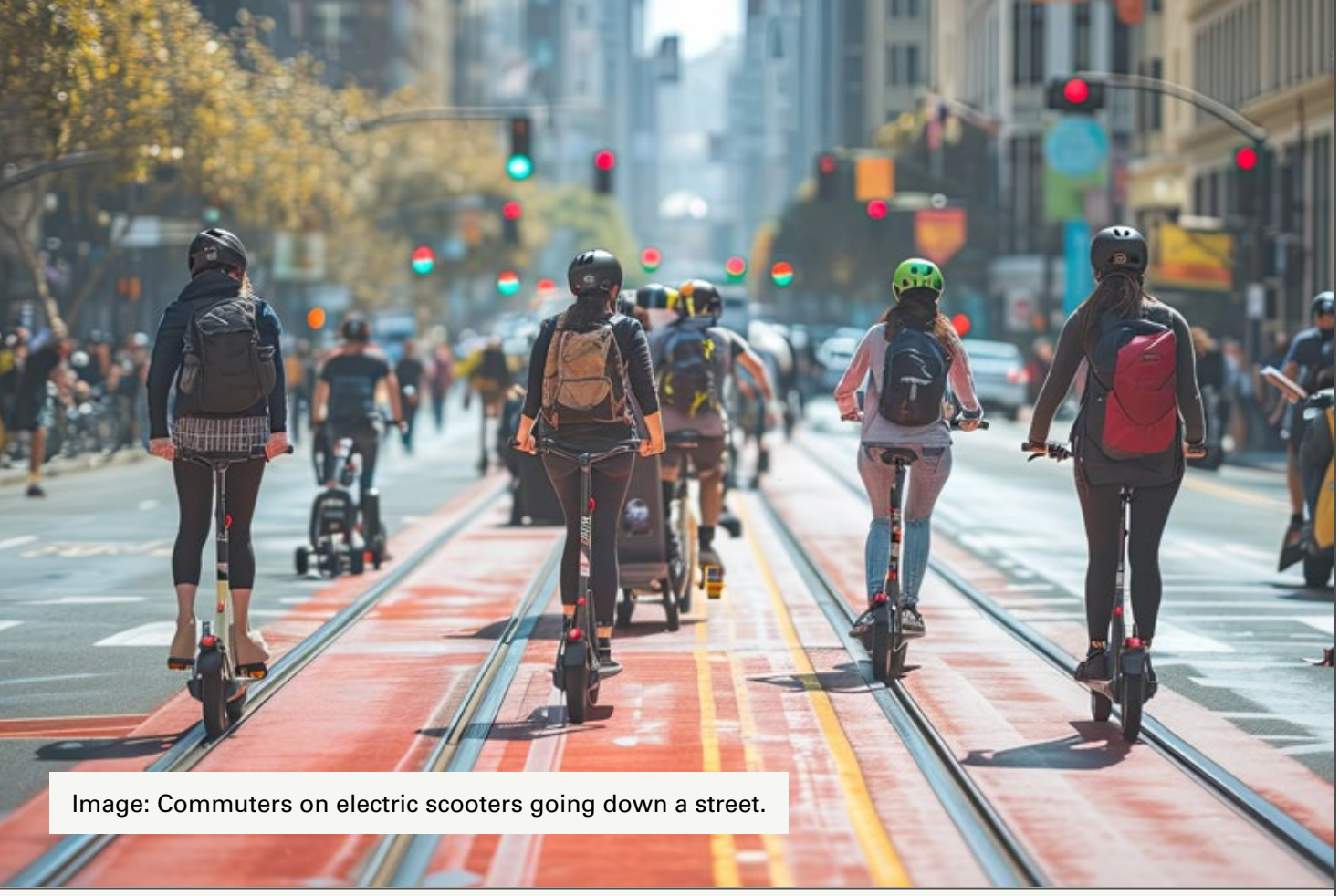


Image: Commuters on electric scooters going down a street.

Acknowledgements

This report was prepared by Foresight Canada, and led by Colton Martinez Rubio, with the support of Alyssa Kelly. Additional support was provided by Danielle Griscti and Rebecca Black.

About Foresight

Foresight is Canada's largest cleantech innovation and adoption accelerator. We bring together innovators, industry, investors, government, and academia to address today's most urgent climate issues and support a global transition to a green economy.

This report was completed in partnership with the City of Toronto's Economic Development and Culture Division.

Table of Contents

Image: Nathan Phillips square in Toronto at night.

While we aim to provide fully accessible content, there may be no text alternative available for some of the content.

If you require alternate formats or need assistance understanding our maps, drawings, or any other content, please contact Economic Development & Culture, Sector Development Office, Rob McMonagle at 416-455-2707.

Executive Summary

The Industry Growth Roadmap for the Sustainable Transportation Sector, commissioned by Toronto's Economic Development and Culture Division (EDC), outlines feedback from the sector and recommendations that support industry growth in alignment with the City of Toronto's 's TransformTO Net Zero Strategy. [1] The central purpose of this roadmap is to identify recommendations and early wins that can support industry growth in the sustainable transportation sector, for each of EDC's pillars for cluster-wide success:

- Collaboration Building
- Advocacy
- Marketing and Promotion
- Workforce Development
- Policies and Regulations
- Market Development

According to EDC's latest data, approximately 203 companies are operating in Toronto's sustainable transportation sector, providing around 23,500 full-time jobs. The sector in Toronto is broken into nine clusters, and the Micromobility, Clean Transportation as a Service (TaaS), and EV Charging clusters were chosen by EDC as the primary focus of the

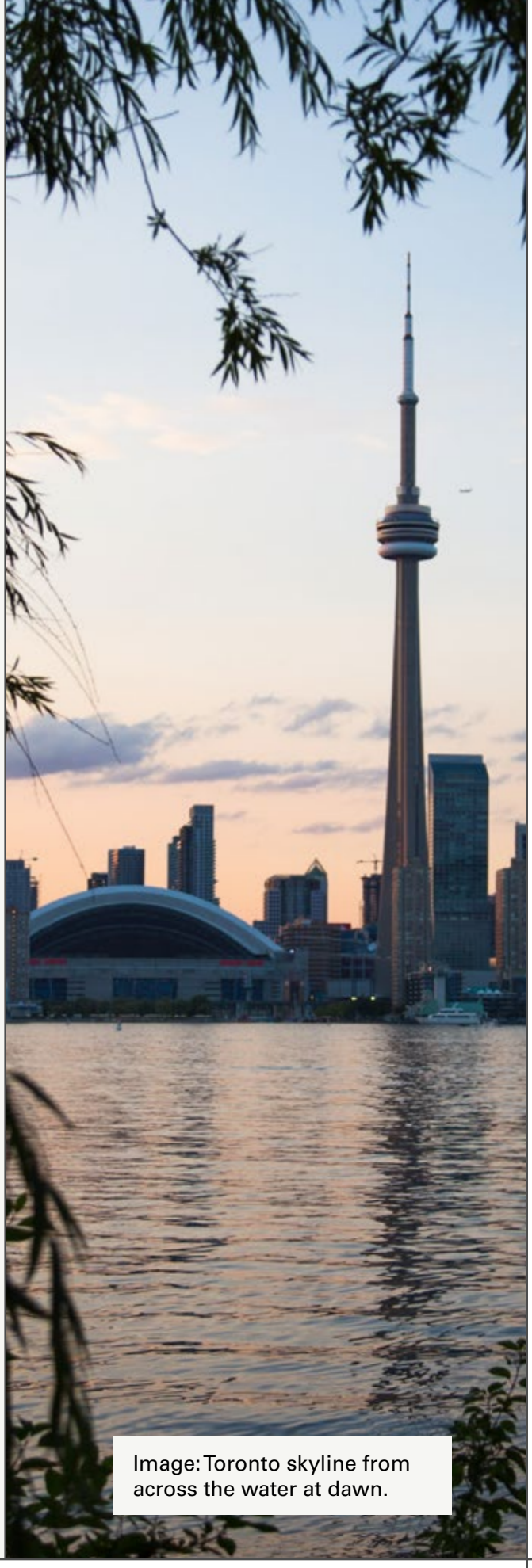


Image: Toronto skyline from across the water at dawn.

roadmap due to their importance as it relates to the number of companies or employees.

The roadmap provides a high-level overview of the growth and local impact of businesses and other organizations in the three priority clusters, noting that significant industry expansion is needed to meet Toronto's 2030 and 2040 climate strategy targets. The roadmap was developed through consultations with expert stakeholders by discussing the challenges, opportunities, and recommended actions for the sector, with a concentration on issues that can be directly affected by either a new Toronto-based Cluster Management Organization or the City of Toronto.

Consultations highlighted specific challenges and opportunities for all three clusters. In conversations with the micromobility cluster, stakeholders emphasized the importance of industry-led collaboration, the role of community bike hubs, the importance of improving collaboration with City agencies, the need to introduce safety standards for electrified mobility, and the opportunity to pursue new research to stimulate innovation. The EV Charging cluster noted the need for a facilitator or connector to unite the fragmented industry and shared feedback on the challenges of working with Toronto Hydro. Stakeholders also highlighted the need to improve customer education (particularly among Multi-Unit Residential Building owners) and advocated for a regulatory review to overcome common barriers to charger installations. The TaaS cluster noted the importance of improving Toronto's environment for local Research and Development (R&D), working with businesses to substitute car parking for bike-sharing stations, and integrating bike-sharing and Toronto Transit Commission services to make multimodal trips easier for commuters.

A common theme emerging from all sector consultations was the need for a "hub", "agency" or "organization" of some kind to fill the role of facilitator of collaboration, innovation, and growth within the sector. This recurring theme confirms earlier work that EDC has undertaken on the potential value of a Cluster Management Organization (CMO) in supporting the sector's growth. The roadmap highlights some of the roles of a CMO, emphasizing its potential to facilitate collaboration between the public and private sector, support innovation, provide business support services, engage in government and industry advocacy, attract investment to Toronto, facilitate access to important financial and non-financial resources, and promote the businesses and services of the sector.

The roadmap distilled the feedback from our consultations into a few priority actions that can accelerate industry growth.

Key Roadmap Actions

Based on stakeholder consultations the key actions to grow the sustainable transportation sector include the following.

Create a CMO for the Sustainable Transportation Sector

The first steps to create the CMO should involve: Establishing a steering committee, strategic plan, legal structure and governance framework; developing a short-term funding strategy that is supported by City funding and engages partners; executing a few high-priority actions to demonstrate the CMO's value; and developing a brand strategy and stakeholder communication plan.

Image: Toronto bike share bike rack.

Develop a Micromobility Deployment Strategy

A cohesive deployment strategy would build on the regulatory strategy being developed by the Transportation Services division by addressing key cluster priorities identified in this roadmap: TTC integration; Bike Share coordination; parking challenges; building out the bike hubs; collaboration with property developers and BIAs; and more. The next steps should involve: Identifying a lead City division and convening staff from key divisions and agencies; developing a project scope; engaging existing cluster bodies for industry feedback; and identifying a third party or full-time city staff member to develop the strategy.

Image: Black and white map of Toronto

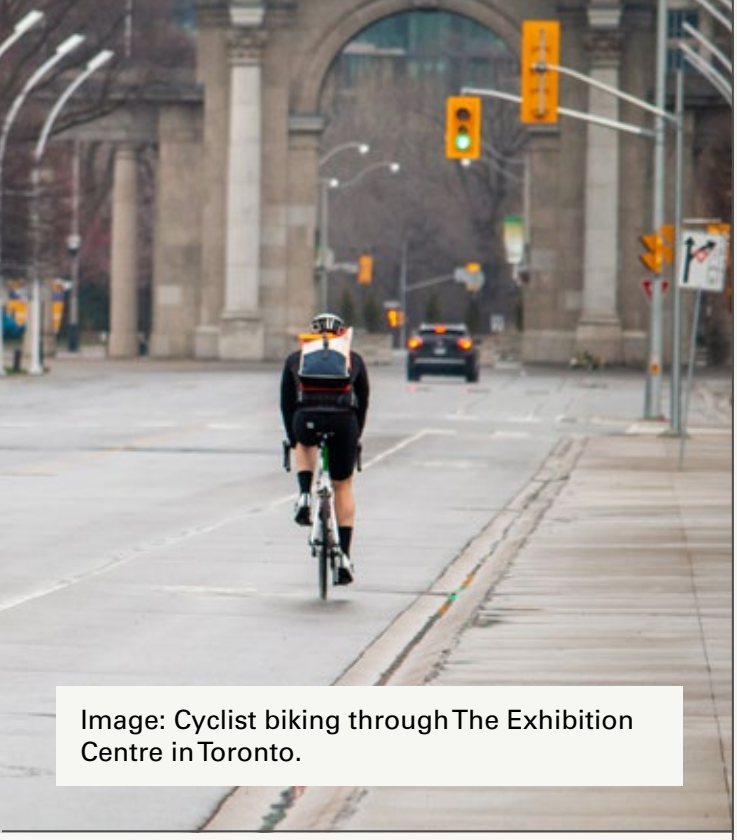


Image: Cyclist biking through The Exhibition Centre in Toronto.

Develop Cluster-Specific Promotion Plans

While the CMO is being established, the City can kickstart sector promotion by tackling key issues such as promoting EV charger deployment in MURBs; marketing cycling's economic benefits, promoting multi-modal travel using micromobility and transit, and generating workforce interest in critical sustainable transportation sector careers. This will require identifying a lead City division, developing a communications strategy, and developing marketing collateral (e.g., blogs, web content; guides, brochures, and advertising campaigns). Upon creation, the CMO can take over promotional activities for the sector.

Establish a Regulatory Task Force

Stakeholders identified the need to convene a regulatory task force to identify and resolve regulatory issues limiting the growth of sustainable transportation solutions. The City should lead the task force and involve key city divisions, along with industry, academia, and important City corporations (e.g., Toronto Hydro, TAF, Toronto Parking Authority). Initial task force opportunities would include responding to the EV Charging cluster's request for a regulatory review, examining opportunities to regulate micromobility battery safety, and identifying City opportunities to support bike parking and maintenance hubs in new building developments.

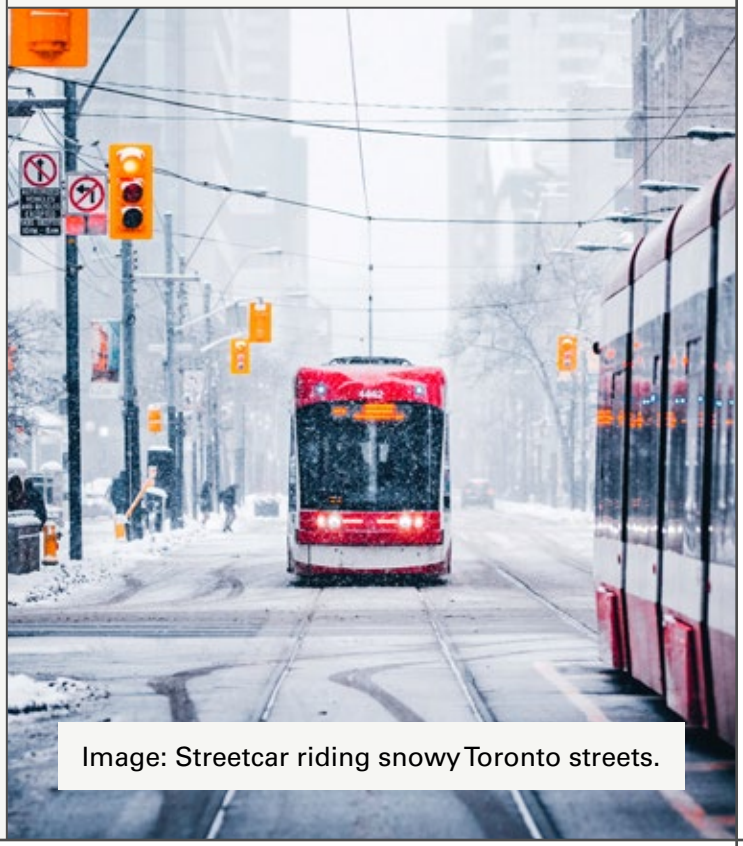


Image: Streetcar riding snowy Toronto streets.

Advance Cluster-Specific Early Actions

Support the Micromobility Workforce Development Committee: The City and micromobility cluster should continue to work together to address the labour force challenges that face the cluster. This initiative is providing national leadership, and continued support from the City is crucial to its success.

Expand Networking Opportunities for the Micromobility Cluster: The cluster needs to create additional formal and informal networking opportunities for its members, similar to what other local green clusters have done.

Complete an EV Charging Market Forecast: EDC should undertake a market study of the local EV charging market to identify supply-side challenges, such as the labour force issues identified in this roadmap. Follow the example set by the "Economic Potential and Workforce Requirements in Toronto's Net Zero Strategy" report.

Promote TTC and Bike Share Toronto Engagement on Micromobility Issues: There are multiple intersections between the TTC, Bike Share and the micromobility industry, including: bike parking; multimodal transportation opportunities; labour force challenges; and challenges in gaining traction at the federal level.

Image: Downtown Toronto office buildings, lit up at night.

1. Introduction

The City of Toronto's (the "City") commitment to sustainable and low-carbon transportation is a cornerstone of its broader climate change and environmental initiatives. The City's plans are encapsulated in the TransformTO Net Zero Strategy (NZS), which sets a target to have net zero greenhouse gas (GHG) emissions by 2040. Reducing emissions produced through transportation activities is a critical focus area as transportation accounts for 35 per cent of Toronto's GHG emissions. [2]

The NZS sets out ambitious targets to transform how Torontonians travel.

By 2030, the City wants 75 per cent of school and work trips under five kilometres (km) to be completed by walking, biking, or by transit, and 30 per cent of registered vehicles to be electric. Additionally, the City plans to install a significant number of electric vehicle (EV) charging ports across public locations: 650 level 3 ports and 10,000 level 2 ports.

For 2040, the City has set a 100 per cent electrification target for personal and transit vehicles (by 2050 for commercial vehicles) and wants 75 per cent of trips between one and five kilometres to be completed by bikes and e-bikes.

To support the achievement of these and other vital targets, Toronto's City Council directed the Economic Development and Culture Division (EDC) to work with local industries and develop a **Sustainable Transportation Industry Growth Roadmap**. The roadmap identifies actions for the City and other stakeholders to increase the growth potential of the local companies in the sector.

The roadmap and other work undertaken by EDC focuses on supply-side actions (industry issues such as supply chain management, workforce development, etc.) that will help the sustainable transportation industry thrive and deliver low-carbon transportation solutions at scale.

Roadmapping enables the identification of critical barriers to the industry's growth and focuses on early, quick and informed actions that can maximize growth while building consensus and strategic alignment between stakeholders. A roadmap differs from a sector strategy in that it does not review all the challenges and opportunities that may influence industry success; it focuses on a few early wins that can positively impact growth.

Image: 3D rendered aerial satellite view of the city of Toronto.

2. Profile of the Sector

Approximately 200 companies are in Toronto's sustainable transportation sector with about 23,500 full-time jobs, according to work done by EDC between 2021 and 2023. EDC defines the sustainable transportation sector as:

> Businesses and other organizations involved in the supply of products and services that move people and goods by modes that: 1) have low environmental impact; or 2) are less environmentally impactful than the standard for that mode. Environmental impacts include using less energy, lower emissions or lower life cycle costs.

Image: Father and son biking down a bike lane.

Image: Electric car charging

EDC divides the sustainable transportation sector into the following clusters:

1. Micromobility (e.g., skateboards, standing or kick e-scooters, bicycles, e-bikes and cargo bikes)
2. Electric-powered cycles (e.g., e-motorcycles)
3. Light electric vehicles (3 and 4 wheels)
4. Electric and other non-carbon fueled cars and large vehicles (e.g., electric vehicles and green hydrogen fuel cell vehicles)
5. Mass transportation technologies (low carbon emission buses, trains)
6. Clean transportation as a service (e.g., TTC, bike sharing, scooter sharing; excluding personal internal combustion engine vehicle ride-sharing)
7. Electric vehicle charging
8. Transportation efficiency and smart transportation
9. Other emerging clusters

Green Companies in Toronto (2023)

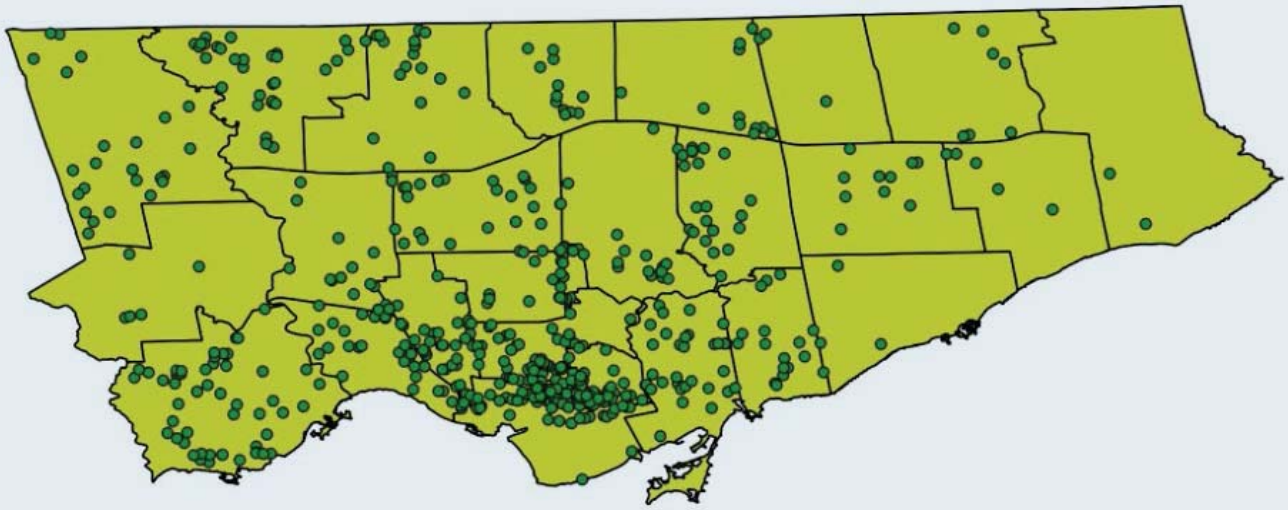


Figure 1.
Distribution of Toronto's green companies (data supplied by the City of Toronto's EDC Division).

For this project, EDC identified the primary clusters of focus related to the number of companies or employees in the sector in Toronto to be:

- Micromobility
- Clean Transportation as a Service
- EV Charging

EDC maintains and updates data on the composition of the sustainable transportation sector in Toronto. According to EDC data, these three clusters account for 182 (~90 per cent) of companies in the sector, the vast majority of which are bike-related companies in the micromobility cluster. While this roadmap focuses on Toronto itself, cluster activity often extends across the Greater Toronto Area.

Toronto's Sustainable Transportation Sector, By Supply Chain Segment

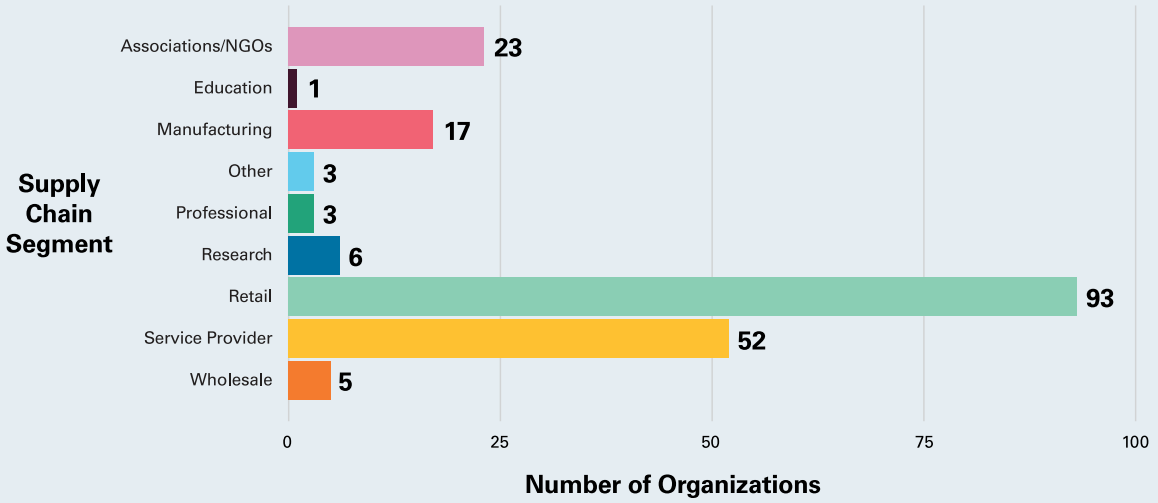
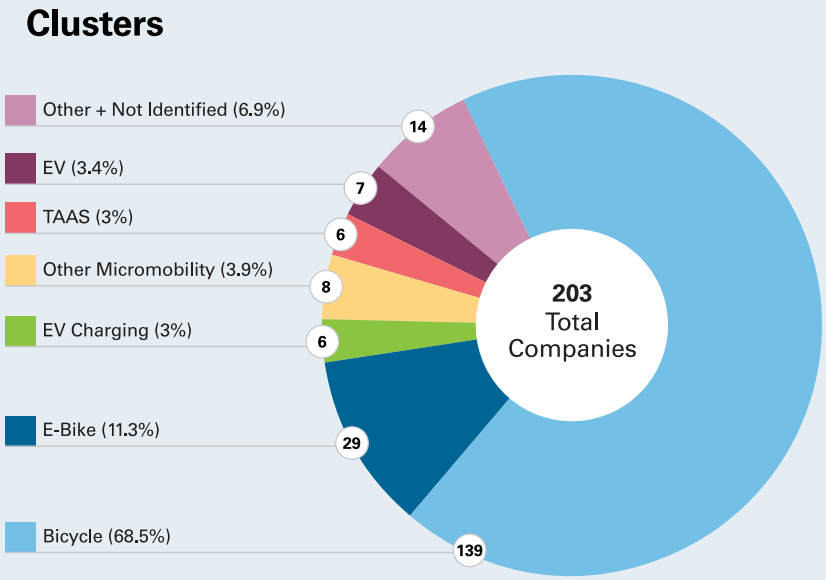


Figure 2.
Organizations in Toronto's sustainable transportation sector, by supply chain segment (data supplied by the City of Toronto's EDC Division). A note on classifying companies: companies and other organizations are complex and often cannot be easily classified into one segment. Standard economic analysis is to place organizations into the category that most of their economic activity is based in (e.g., EDC would not include big box stores that sell bikes into the micromobilty cluster as retailers).

Toronto's Sustainable Transportation Sector

Figure 3.
Distribution of Organizations in Toronto's sustainable transportation sector, by cluster and number of companies (data supplied by the City of Toronto's EDC Division). TaaS includes public transportation; Micromobility includes some companies that provide TaaS.



Micromobility

Toronto's micromobility cluster is integral to the City's commitment to sustainable transportation. The vehicles that the micromobility industry provides, which include bikes, e-bikes, and other vehicles such as e-kick scooters, offer a flexible alternative to traditional motor vehicles and public transit for short-distance (e.g., under 5 km) travel. The introduction of electrically powered micromobility vehicles extends this range considerably. Toronto has developed a comprehensive approach to supporting and expanding its biking infrastructure, promoting bicycles as a viable mode of transportation, including through the Toronto Parking Authority (TPA)'s rapid expansion of Bike Share Toronto.

Toronto boasts an extensive network of bike routes designed to ensure safe and efficient travel for cyclists. This network includes dedicated bike lanes, shared roadways, and multi-use trails. Plans, programs and policies led by the City for the cluster include the Cycling Network Plan, ActiveTO, and the Vision Zero Road Safety Plan. Bikes and e-bikes are widely promoted and deployed across the city. However, e-scooters are not, as the City has chosen not to participate in Ontario's pilot program. City council directed staff

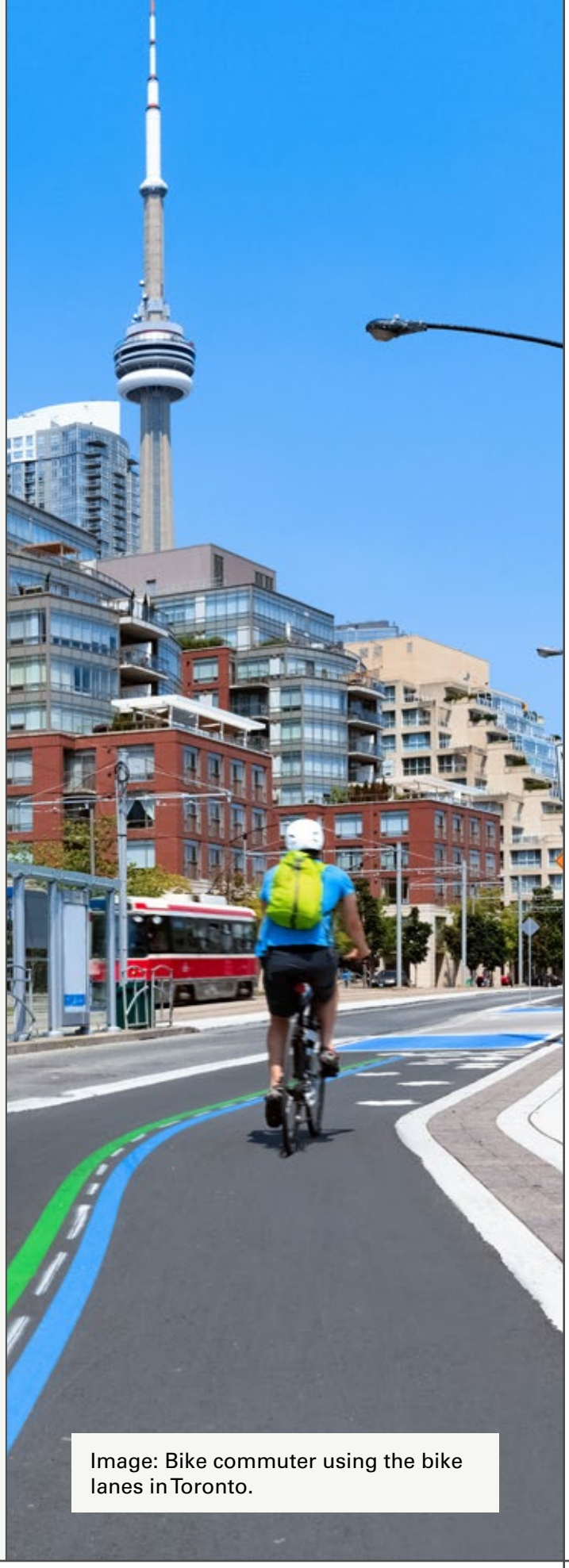


Image: Bike commuter using the bike lanes in Toronto.

to develop a "micromobility strategy" in mid-2023, which "will clarify what types of micromobility are allowed to be used and where" and "address key opportunities and challenges" for this mode of transportation. This strategy will also discuss issues such as:

- Potential micromobility pilot projects
- Education and enforcement to address illegal parking in bike lanes and illegal sidewalk riding
- To require standardized individual identification markings on e-scooters and helmet mandates as part of any future pilot [3]

The opportunities for growth in the micromobility cluster are significant. According to one market research firm, the Canadian e-bike market was estimated to be worth $953 million in 2022 (converted from USD at a rate of $1.30) and is expected to triple in value by 2030. [4] [5] Bikes, e-bikes, e-scooters and other forms of micromobility have exploded in popularity and accessibility in recent years. Between 2020 and 2022, over 60 kilometres of multi-use trails, cycle tracks and bicycle lanes were added in Toronto, and the City reported that downtown weekday cycling volume grew 1.5 times from 2019. [6] The estimated number of bicycles owned in Toronto is now between 2.1 to 2.7 million. As of 2021, approximately 2.2 per cent of trips in Toronto between one and five km were cycled. [7]

Micromobility Companies by Toronto Ward (2023)

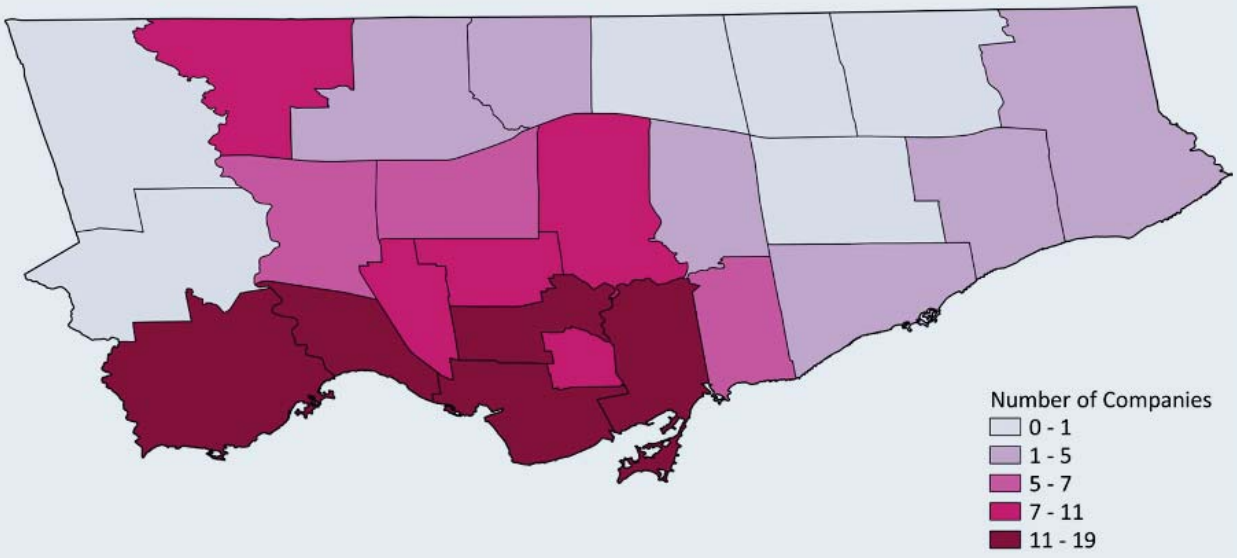


Figure 4.
Geographic distribution of companies in Toronto's micromobility cluster, by Ward (data supplied by the City of Toronto's EDC Division).

EV Charging

The EV charging cluster in Toronto is a critical component of the City's targets for the sustainable transportation sector. The cluster is growing rapidly to meet the needs of EV owners and evolving through innovative plans designed to expand its reach and efficiency. Over 20 companies that serve the EV charging market are operating in Toronto. Some serve primarily the local and regional markets, while others count Toronto as one of many global markets.

Toronto's EV charging network comprises a mix of public and private charging stations, with installations in residential, commercial, and public spaces. Commercial charging infrastructure includes level 2 and level 3 (DC fast chargers). According to ChargeHub, as of January 2024, there were 2,745 publicly accessible charging stations in Toronto. Toronto's EV charging market comprises various segments, including:

- Public charging on public spaces (e.g., Toronto Parking Authority), which involves procurement or service agreements with public charging service firms and includes on-street and off-street parking.
- Public charging on private property (e.g., malls, big box stores, privately owned parking lots), which involves retail sales or service agreements.
- Private charging for fleets, which involves retail sales or service agreements.
- Private charging for shared parking in private property (e.g., condo and apartment buildings), which involves retail sales.
- Private charging for individuals on their private property (e.g., single-family and other residential homes), which involves retail sales.

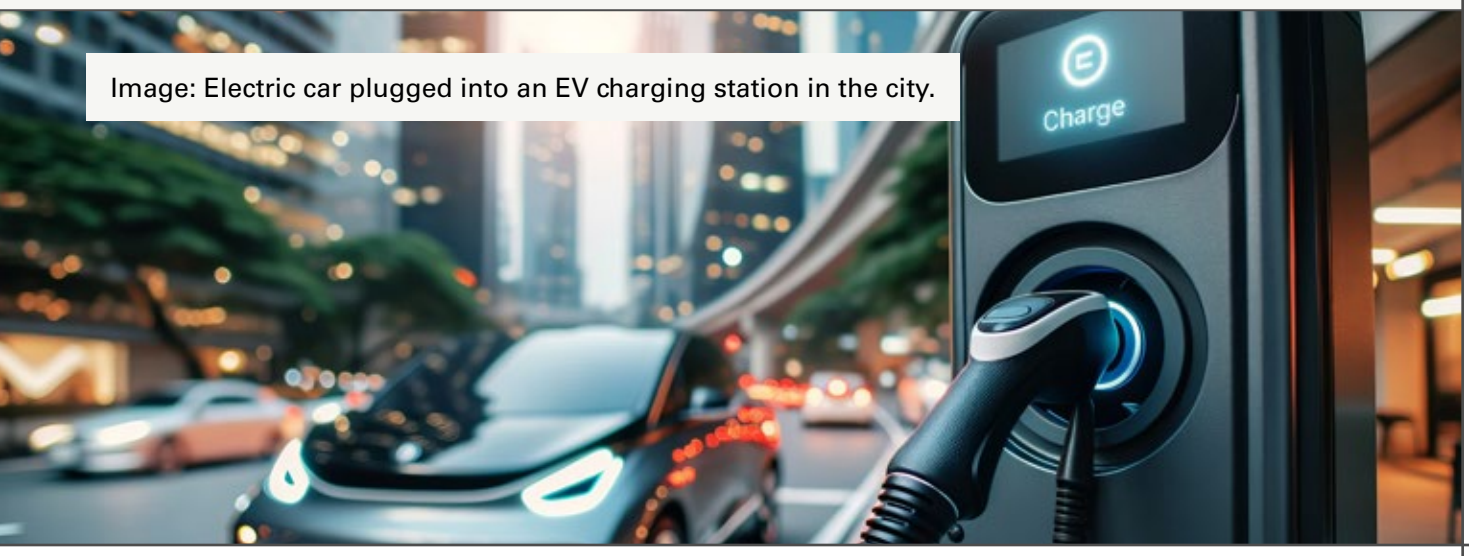


Image: Electric car plugged into an EV charging station in the city.

In support of the NZS targets, the City's approach to expanding EV charging infrastructure involves collaboration between municipal authorities, utility companies, and private sector partners. Key elements include an EV Strategy, which addresses public charging infrastructure, incentives for private charging installations, and integration with City planning and transportation policies; resources and funding for EV charging installations in multi-unit residential buildings and workplaces; updates to building codes and regulations; partnerships and incentives with utilities, businesses, and other stakeholders to facilitate the installation of EV charging stations; and public awareness and education efforts. The City is also developing a Public EV Charging Plan to guide the deployment of publicly accessible charging infrastructure between 2023 and 2040.

While the cluster is on the brink of expansion, Toronto is still in the early stages of EV adoption. According to City-supplied data from the Ministry of Transportation, as of 2023, 1.1 million passenger vehicles were registered in Toronto, and only two per cent (27,336) were plug-in hybrid and battery EVs.

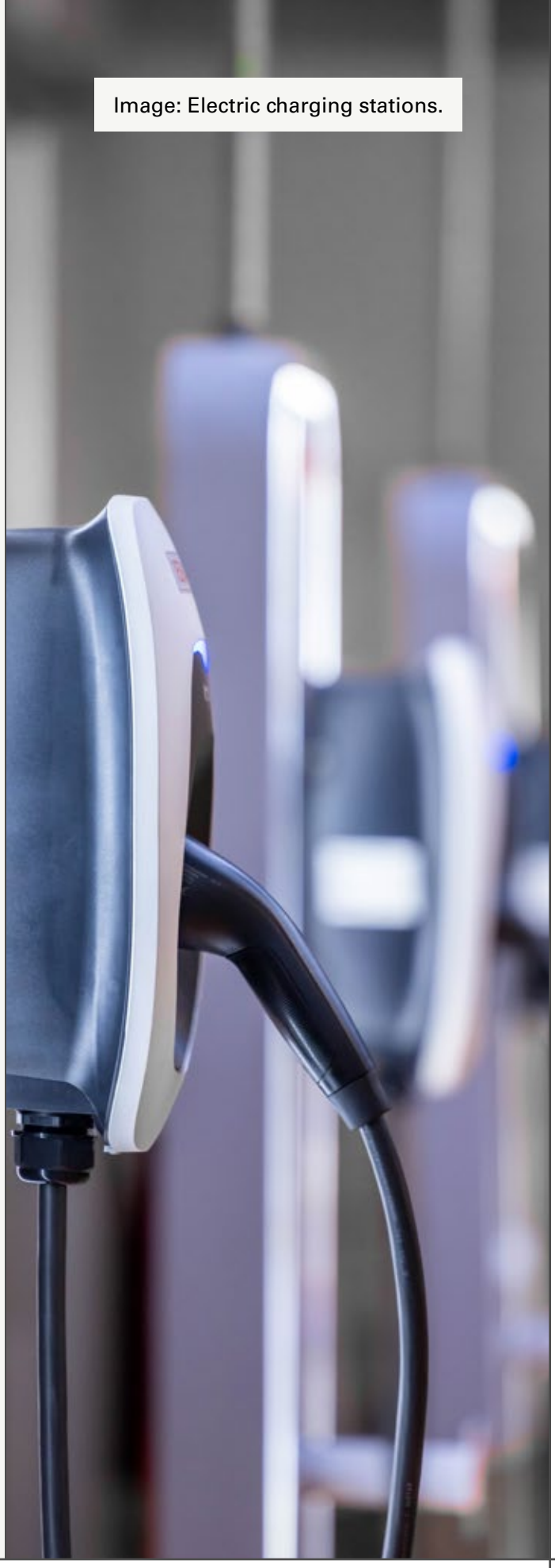


Image: Electric charging stations.

Clean Transportation as a Service

Toronto's Clean Transportation as a Service (TaaS) cluster is a dynamic component of the city's sustainable transportation sector. The cluster encompasses a wide range of services, leveraging innovative service models to offer climate-friendly alternatives to vehicle ownership, such as public transit and bike sharing (for the purposes of this roadmap, passenger vehicle sharing was considered out of scope). TaaS can be an accessible and low-cost form of sustainable transportation, enabling users to travel to and from their destinations without directly incurring upfront capital costs or maintenance expenses. Toronto is also exploring integrated mobility that combines various clean transportation modes into a single, accessible service. Bike sharing and transit services both aim to streamline the user experience, making it easier for individuals to plan and pay for trips using a combination of public transit, bikes, and electrified micromobility.

Toronto's TaaS cluster is diverse and includes services from local micromobility companies, TPA's Bike Share Toronto program, and public transit services from the Toronto Transit Commission (TTC). City data on Toronto's green industries estimated that there were up to 14 companies in Toronto's TaaS cluster as of 2019 that provide a variety of bike and electrified micromobility-sharing services. Bike Share Toronto operates over 9,000 bicycles and 788 stations across Toronto. [8] In 2023, Bike Share Toronto added 340 e-charging docks and deployed 1,392 e-bikes across the network. [9]

The TTC is developing an Innovation and Sustainability Strategy, which will be published sometime in 2024 and will chart its future efforts to decarbonize its services. Currently, the TTC has introduced hybrid and electric buses to its fleet and committed to be 50 per cent zero emission by 2032 and 100 per cent zero emission by 2040. [10] Through the Green Bus Program, the TTC operates the largest fleet of battery-electric buses in North America. [11] Recent investments include $300 million for electric buses and $390 million for 300 hybrid electric vehicles. In addition to its subway system, the TTC also operates low-floor accessible streetcars, managing nine streetcar lines that cover around 355 kilometres and transport over 26 million passengers as of 2022. [12]

3. Impact of the Sector

As noted, the transportation sector accounts for 35 per cent of Toronto's GHG emissions, most of which comes from personal vehicle use. While the City's aims to electrify road transportation and decrease the share of trips made by car are driven by a need to reduce GHG emissions, there are also significant local economic opportunities associated with decarbonization. From 2015 to 2019, the sustainable transportation sector outpaced Toronto's overall economy in employment growth (annual growth of 4.9 per cent relative to 1.6 per cent for Toronto as a whole). Sustainable transportation also contributed $1.44 billion to Toronto's real GDP in 2018.

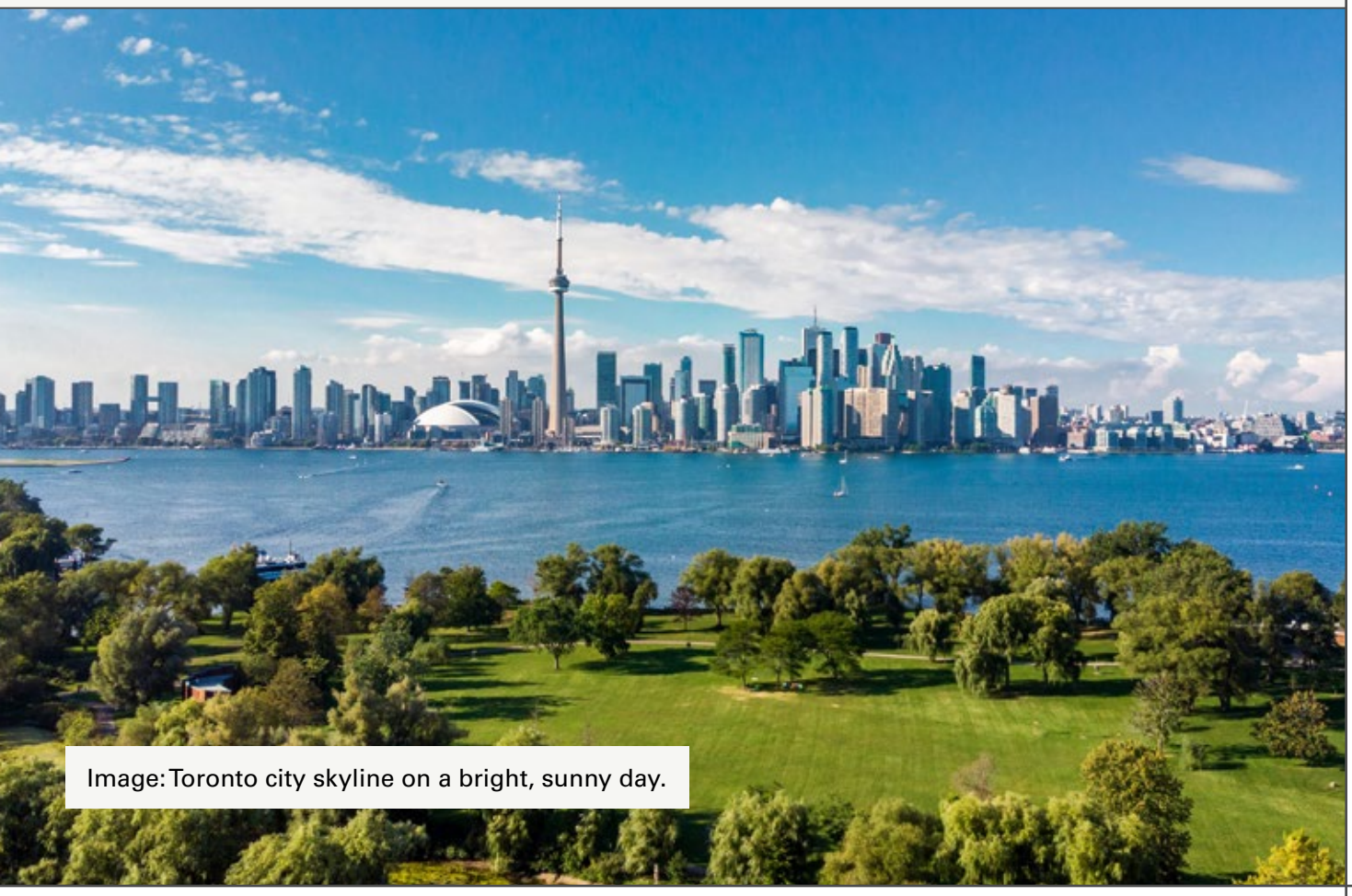


Image: Toronto city skyline on a bright, sunny day.

Micromobility

A five-kilometre trip taken by bicycle will prevent 1.25kg of CO2 emissions (0.25kg CO2 per km) if it displaces a trip taken by an internal combustion engine (ICE) vehicle. [13] While a single trip's contribution is minor, the NZS 2040 target equates to over 648 million trips taken annually by bikes. Cycling can substantially reduce emissions depending on the modes of transportation it substitutes. In addition to the health, climate and congestion benefits associated with increases in cycling and micromobility use, substantial community economic benefits can occur. In 2017, the Centre for Active Transportation (TCAT) released a report that indicated new bike lanes had no adverse economic consequences for local businesses on Bloor Street and actually led to an increase in both monthly customer expenditure and the volume of customers during the study period. [14] A broader investigation that analyzed 23 studies across North America validated these findings. [15]

More recently, the economic impact of Toronto's cycling industry was forecasted in the EDC report "Economic Potential and Workforce Requirements in Toronto's Net Zero Strategy" (developed alongside this roadmap by McSweeney & Associates), which undertook a market growth economic impact study of the deployment targets in the City's NZS. The study found that only 13.2 million trips between one and five kilometres are currently cycled (approximately 2.2 per cent); therefore, reaching the City's 75 per cent target, which translates to 648 million trips, would require 4,800 per cent growth by 2040.

The McSweeney & Associates study found that businesses in the cluster will need to dramatically increase the number of bike mechanics employed to service expected demand. The estimated 200 current full-time bike mechanic positions in Toronto will need to grow by between 3,000 and 12,400 by 2040 to support the growth needed to achieve the NZS target for cycling. 36,500 new FTE jobs and $3.3 billion in increased sales would also be created in 2040 as a result of meeting the NZS target.

Image: Bike mechanic working on a bike frame.

EV Charging

Technical modelling from the NZS found that electrifying all passenger vehicles in Toronto could cut GHG emissions by 1.95 megatonnes annually. Each EV introduced in Toronto is estimated to reduce annual GHG emissions by 3 to 5 tonnes compared to traditional gas-powered cars. Meanwhile, plug-in hybrid EVs are expected to decrease emissions by 2 to 3.5 tonnes annually. [16] Fulfilling this emission reduction potential requires a significant build-out of charging infrastructure. Reaching the City's 2030 goal of 10,650 level 2 and level 3 ports would represent a nearly 400 per cent increase in charging stations by the decade's end.

While we lack market growth forecasts equivalent to the one completed for the micromobility cluster, there are known labour impacts associated with such a large increase in the deployment of EV chargers. There will be an increasing demand for skilled professionals in areas such as technical installation and electrical engineering, civil engineering and construction, information and communication technology, maintenance and technical support, policy and planning, sales and marketing, and more.

Image: EV Charging Stations

Clean Transportation as a Service

Clean TaaS plays a major role in Toronto's transportation sector and the City's success in reducing transportation-related GHG emissions. Transitioning an individual's daily commute from driving a car to public transit is estimated to cut annual greenhouse gas emissions by 2.2 metric tons. The TTC estimates that an average trip by transit in 2040 will reduce an individual's emissions by 97 per cent compared to driving an internal combustion engine vehicle. [17] As previously noted in the micromobility section, cycling trips via bike-sharing companies can also enable positive environmental and economic outcomes for the city.

To realize projected emissions savings, the TTC is retiring its diesel-only bus fleet and making significant strides toward the City's net zero targets with its Green Bus Program by incorporating 300 more electric buses into its current fleet of 60 electric vehicles. The TTC is the sustainable transportation sector's largest employer, with over 16,000 staff.

The TTC partnered with The Mobility Network centre at the University of Toronto to quantify the benefits of capital investments in the transit system. [18] Phase 1 findings of their research indicated:

- Every $1 invested in the TTC yields approximately $7.14 in benefits ($1.08 in Economic and Regional Development benefits + $6.06 in Quality of Life benefits).
- 2023 TTC spending generated $2.1 billion in economic output and more than 12,000 jobs (not including the more than 17,000 employed by the TTC directly) in the GTA.

While the TTC plays the largest role in the Clean TaaS cluster, Bike Share Toronto and other private bike-sharing businesses also play an enormous role in city mobility. The 2023 review for Bike Share Toronto highlighted its significant recent growth: their service now reaches nearly all 25 Toronto wards with over 780 stations, and ridership increased by 950,000 from 2022 to 2023, for a total of 5.7 million rides. Despite record growth, this figure still represents a minor portion of the more than 648 million cycling trips needed by 2040 (as noted in the micromobility section).

Image: Aerial view of the neighbourhood of Yorkville in Toronto.

4. Process Followed to Develop the Roadmap

Information for the roadmap was gathered through cluster-specific workshops, research interviews and a literature review, from November 2023 to February 2024. The principal source for the recommendations in this roadmap came from in-person and online workshops, and interviews with cluster experts. A wide range of stakeholders from all three clusters were consulted, including:

- Retailers
- Manufacturers
- Service Providers
- Sales and rental companies
- Industry, education and advocacy associations
- City of Toronto officials
- Toronto Transit Commission
- Toronto Hydro
- The Atmospheric Fund
- Independent sectoral experts

EDC's Sector Development Office uses six pillars to identify opportunities for economic growth and cluster-wide success. Stakeholder consultations to develop the roadmap focused on collecting feedback on each of the six pillars. While we heard from the sector that increasing demand is an important part of growing the industry, the feedback included in the roadmap was limited as much as possible to supply-side actions within the scope of this project and EDC's mandate. "What We Heard" was distilled into over 70 stakeholder recommendations and included as an appendix. The recommendations were used to inform the development of the roadmap's "Next Steps" section.

Table 1.
EDC's Pillars of Economic Growth.

Pillar	Description
Collaboration Building	Strategies, connecting stakeholders together, networking, strengthening the supply chain, and attracting new firms.
Advocacy	Advocating for changes in the other pillars and the level of support given to the cluster
Marketing & Promotion	Communicating the value of a product, service or brand to customers and potential users.
Workforce Development	Talent development, talent attraction and building skills in the workforce and in businesses.
Policies & Regulations	The "environment" that businesses operate in. Both regulations and policies surrounding the company (e.g., zoning, labour laws); deployment of products/services (e.g., bylaws, licensing, permits); and product and service safety and quality (e.g., CSA standards).
Market Development	The expansion of the total market for a product or a company. This can include international trade or creating conditions in domestic markets for increased sales or deployment.

Image: Bike commuters on the road.

5. Learnings from the Consultations: What We Heard

This section of the roadmap summarizes the insights gathered from the stakeholder consultations. The consultations aimed to understand the sector's landscape, challenges, and opportunities. While the feedback received in our consultations was extensive, the learnings have been summarized for brevity. Longer-form feedback was supplied to EDC separately to ensure City staff have all meaningful input from the sector.

Overall, feedback from the consultations emphasized the importance of collaboration and innovation to foster industry growth while reaching the City's environmental and economic objectives.

Overarching Theme: Develop a Cluster Management Organization

Feedback received from the sustainable transportation sector throughout this project made it clear that there is a role for a Cluster Management Organization (CMO). A CMO can support or respond to many of the sector's recommendations that do not fall into any other organization's traditional role or expertise.

Throughout our consultations, we heard participants express the need for "a network or body of some kind to bring everyone together and share insights and updates," a facilitator to "organize opportunities for companies to discuss common issues and solutions," and "a physical hub for the industry." A CMO can respond to all these needs and play a pivotal role in fostering collaboration, innovation, and growth. With the complex interplay of various stakeholders such as government bodies, research institutions, businesses, and consumers, a CMO is a central hub for coordinating efforts and aligning interests towards common goals.

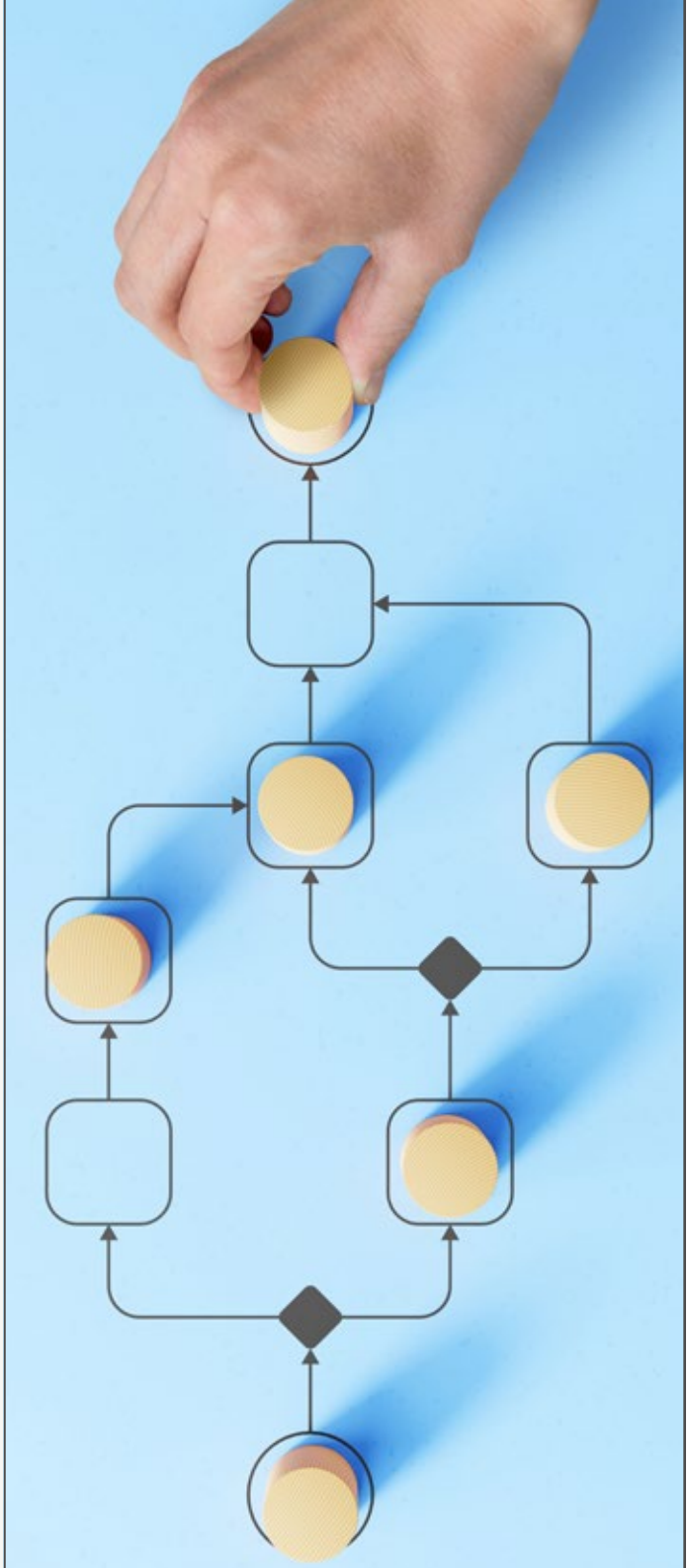


Image: Hand placing a wood block on an interconnected baord of other wooden blocks.

A CMO's primary roles and functions can include:

- Fostering Collaboration: Promoting collaboration among businesses and institutions within each cluster. This includes facilitating networking events, encouraging joint projects, and project partnerships that can lead to innovation and shared growth.
- Supporting Innovation: Playing a crucial role in fostering innovation and bringing research and development activities to Toronto by connecting cluster members with research institutions, facilitating access to new technologies, and identifying industry trends and opportunities for innovative products and services.
- Providing Business Support Services: Offering various direct services to cluster members, such as business development and marketing training.
- Advocacy and Representation: Acting as a voice for the cluster, a CMO may engage in advocacy to influence governments and regulatory bodies, investors, and other external stakeholders.
- Attracting Investment: By promoting the cluster's strengths, a CMO can attract new businesses and investment, further stimulating growth.
- Facilitating Access to Resources: Supporting cluster members in accessing essential resources such as funding, talent pools, or infrastructure.
- Promoting the Cluster: Marketing cluster capabilities and successes to external audiences, attracting talent, and enhancing a cluster's overall reputation.
- Monitoring and Research: Monitoring the performance of a cluster and establishing partnerships with academia to research key trends, opportunities, and challenges.

Previous research developed or commissioned by the City of Toronto has already identified best practices for how a CMO could be established and provided examples of the opportunities and challenges it could respond to. [19] [20] [21]

Micromobility

Consultations with the micromobility cluster centred on fostering collaboration, driving innovation, enhancing safety, and improving accessibility. A significant outcome of the workshop was the consensus on the need for industry-led initiatives to propel growth forward. Suggestions included continuing monthly calls of the micromobility workforce development committee and networking events to widen stakeholder participation and formal outreach for establishing B2B partnerships. An example highlighted was establishing a physical hub to house, connect and spur industry manufacturing, training, R&D and innovation, along with other collaborative projects and opportunities.

Discussions underscored the importance of improved collaboration between industry and City agencies. Initiatives like SmartCommute Toronto were highlighted for boosting secure bicycle parking facilities and supporting year-round cycling through better infrastructure. The role of community bike hubs was identified as providing valuable market development, workforce development and promotional functions, with projects like CultureLink's Bike to School and Cycle Toronto's workplace education programs highlighted as models for potential expansion. The hubs were praised for their effectiveness in introducing new riders to cycling and teaching basic bike maintenance skills.

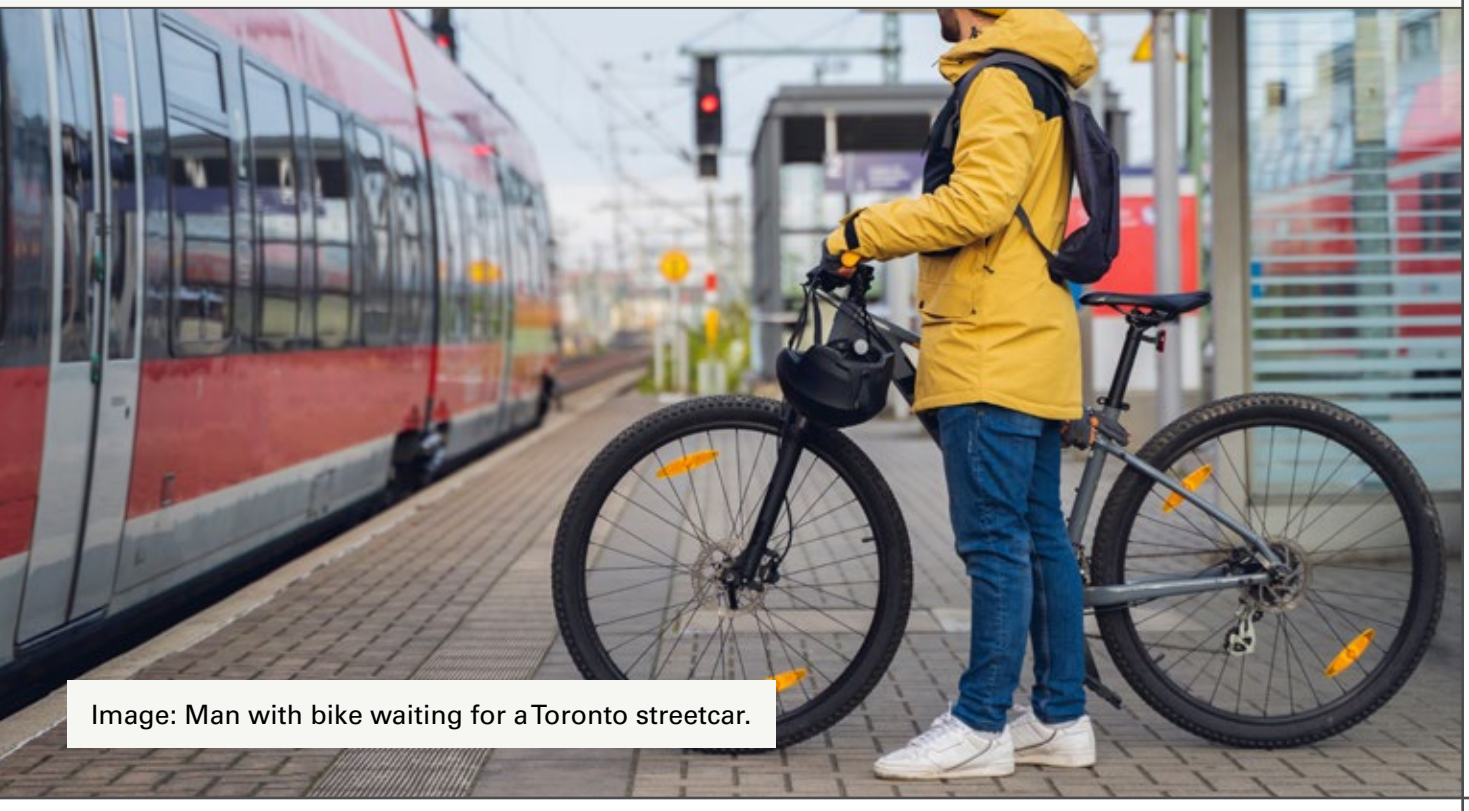


Image: Man with bike waiting for a Toronto streetcar.

Image: E-bike handlebars and basket.

A strong emphasis was placed on the importance of research and innovation, especially while the adoption of electrified micromobility options rises. Collaborations with educational institutions (e.g., U of T School of Cities, York U, TMU) and delivery apps were proposed. Suggested areas for research included:

- Using ridership and location data collected by the ongoing Transportation Tomorrow Survey to illustrate and map growth potential across multiple commute options for short (less than 5 km) distances, demonstrating the connections between the installation of protected infrastructure and ridership in these and future corridors.
- Exploring data-sharing partnerships with e-bike companies and delivery apps (e.g., DoorDash, Uber; Zygg, Zoomo) to provide info on where trips occur to support the expansion of secure bike parking and e-charging facilities, easing the strain on TTC and GO Transit.
- Collaboration with delivery apps to maximize efficiency and prioritization of sustainable delivery modes in the city, such as exploring how delivery companies decide what orders must be taken by car, the delivery 'radius algorithm' for bicycles vs. cars, and more.
- Reviewing data on product safety for e-bikes, including exploring standardizations across manufacturers for batteries (mount and casing shape), motors (bolt patterns), and chargers (plug types).

Stakeholders also emphasized that the growth in electrified micromobility and its importance to the industry necessitated a proactive response to safety concerns. A suggestion was made to develop e-bike and e-cargo bike safety courses in collaboration with Cycle Toronto. In collaboration with Toronto Fire Services, stakeholders suggested new educational resources could be created for lithium-ion battery safety awareness. Encouragement of battery safety and recycling programs, such as the existing "Call2Recycle", could also expand. Recommendations to promote new resources included investing in translation (e.g., CultureLink Cycling Handbook), using modern video formats on social media, and leveraging ads on bus shelters (e.g., Vision Zero campaign).

Identifying new spaces for bike repair and maintenance in residential and commercial buildings was emphasized as a vital opportunity to grow the cycling industry. There was widespread agreement that support is needed to work with developers in Toronto to plan for dedicated spaces that could house bike repair services. For example, Canada Goose's new Toronto headquarters has "an on-site bike service run by the building that lets cyclists get regular tune-ups and repairs while they work." [22] This could contribute to an improved geographic distribution of bike repair services outside the downtown core. Waterfront Toronto's green building requirements were highlighted as an example of guidelines to create space for residents to perform maintenance in a parking area. [23]

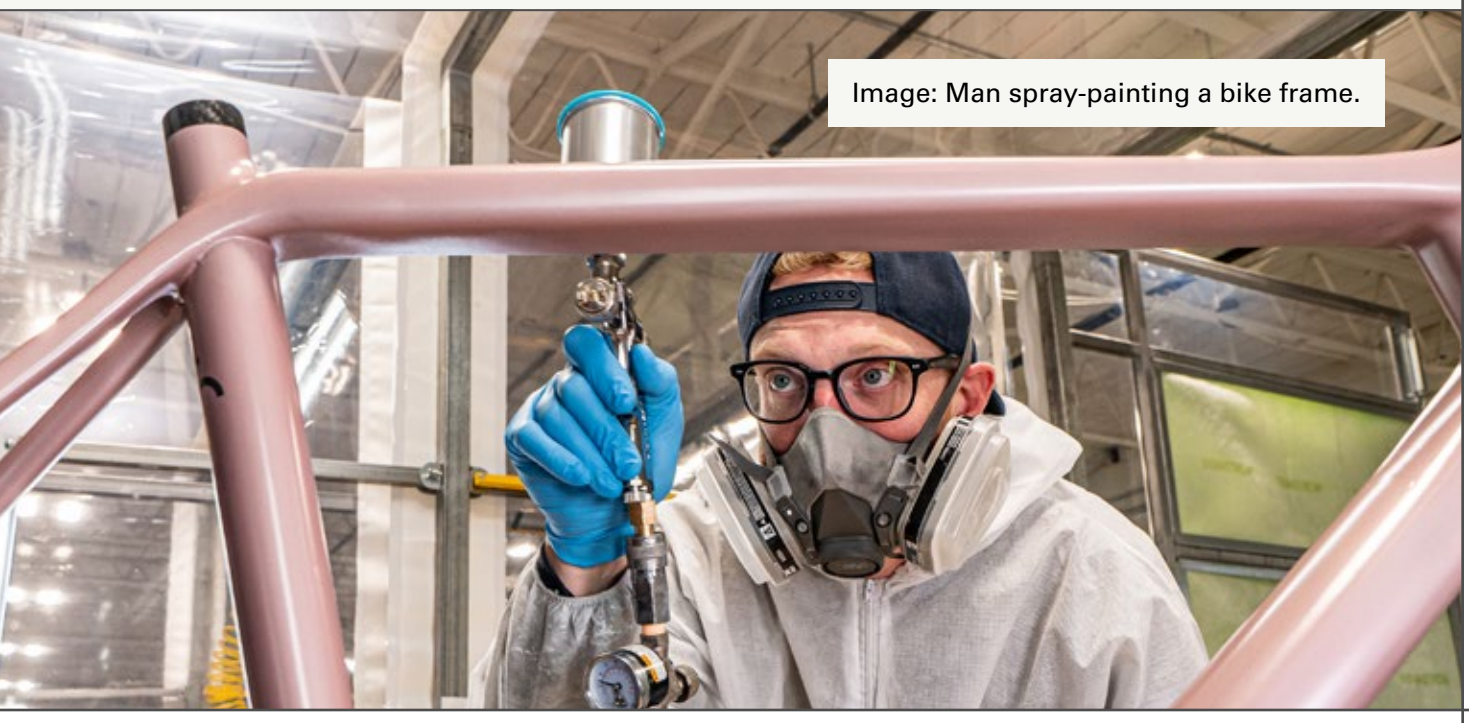


Image: Man spray-painting a bike frame.

Image: EV charging stations.

EV Charging

Consultations with the EV Charging cluster highlighted the need for robust advocacy and effective marketing strategies to foster EV charger adoption. Experts identified significant challenges in retrofitting existing buildings to accommodate EV charging stations and noted the need to update building codes and regulations. Stakeholders emphasized the importance of installations in Multi-Unit Residential Buildings (MURBs), where a substantial fraction of Toronto's population lives. Logistical support for condo boards and property managers undertaking an EV charger installation was identified as a critical market need. Challenges such as the common need for electrical vault upgrades when retrofitting older buildings were also highlighted, and stakeholders emphasized that project managers should be engaged to more consistently include EV charging in broader building transitions, such as during a deep retrofit or heat pump installation.

The City's role in facilitating connections, reducing bureaucratic hurdles, and promoting innovation through strategic partnerships was deemed essential for industry growth. Some stakeholders were vocal regarding the need for a regulatory review. They emphasized that a more streamlined approach to permitting and a review of out-of-date regulations

would ease common barriers EV charging companies face.

A significant point of emphasis among stakeholders was Toronto Hydro's impact on cluster success. Although both parties reported a mutual interest in deeper collaboration, many industry participants shared that working with Toronto Hydro tended to be challenging, with some even describing the utility as a potential barrier to innovation. Several stakeholders noted that the City should encourage Toronto Hydro to be proactive in supporting the growth of the local EV industry. Some stakeholders reported that interactions with Toronto Hydro often presented financial and logistical hurdles, including lengthy service upgrades and significant costs associated with engineering assessments, which they feel has dampened the adoption pace. Reviewing service upgrade costs to ensure that they are appropriately costed and that potential efficiencies are captured, and looking at how the costs can be socialized over the rate base was deemed essential for facilitating more charger installations. Stakeholders called for the City of Toronto to ensure Toronto Hydro possesses the necessary capacity and direction to achieve municipal climate objectives.

Stakeholders expressed a desire for an organization to lead more robust federal and provincial advocacy for regulatory changes and financial support mechanisms. The need for support to undertake targeted marketing and promotion efforts to dispel misinformation and encourage EV charger adoption was also highlighted.

Concerning workforce development, stakeholders called for more coordinated efforts between the City, higher education institutions, and industry to address skill gaps and inform potential tradespeople about opportunities in the EV charging sector. Workshop participants expressed seeing significant interest in the labour force but have heard anecdotally that new and existing tradespeople struggle at times to find a way to break into the clean economy. Stakeholders advocated for an organization to create and better publicize dedicated FAQ resources for prospective workers and increase collaboration between the public sector, education institutions, industry and trade associations to eliminate information gaps.

Clean Transportation as a Service

Our conversations with the Clean TaaS cluster included e-scooter and e-bike ridesharing companies, as well as Bike Share Toronto and the TTC.

Image: Toronto streetcar in the city.

Toronto Transit Commission

Conversations with TTC representatives identified several vital takeaways. First, improving collaboration with other firms and agencies was raised as crucial to growing clean shared mobility services in Toronto. This includes the TTC's coordination with Bike Share Toronto and other TaaS companies, and its role in the City's micromobility strategy. Conversations also highlighted that improved collaboration could involve reviewing how policies such as parking regulations and congestion management plans indirectly impact TTC services, including how they do or do not prioritize transit and active mobility. Difficulties attracting and training workers, particularly engineering staff, were noted as significant hurdles due to market capacity constraints and competition between transit agencies for similar staff.

Funding is one of the primary challenges for the TTC, with the need for long-term, guaranteed funding raised, as current budget cycles last only two to three years. Delays in large projects, such as electric bus procurements, can arise due to funding approval issues, bureaucratic hurdles, or unforeseen problems in the procurement process and can exceed budget periods (e.g., money has to be spent in a given time period or it is lost). Federal funding criteria were raised as another challenge, as they can often be restrictive and exclude public transportation infrastructure.

The length of the procurement process was highlighted as a supply chain issue, along with the significant increase in prices for electric buses over the past years. TTC representatives have observed major financial struggles along the supply chain, with some bus manufacturers seeking advance payments and others closing their doors entirely. The bus industry appears to be facing existential concerns as the competition among manufacturers in the supply chain dwindles.

In response to these changes, there was a discussion of the potential role of financial incentives to grow local R&D and manufacturing and the potential importance of attracting European bus manufacturers to Canada. The themes all indicated a broader need for a strategy to enhance the competitiveness and sustainability of the TTC and the TaaS cluster.

Bike Share Toronto and TaaS Companies

Clean TaaS companies in Toronto, which include bicycle and electric scooter-sharing businesses, face multifaceted obstacles ranging from regulatory hurdles and infrastructure limitations to workforce constraints.

The industry reported that while e-bikes have grown in popularity due to their ability to cover longer distances and durations, they face challenges with charging infrastructure due to power requirements. Expanding e-bike charging stations is both an opportunity and a challenge, given the need for direct power sources and the difficulty of finding suitable locations for these stations. Services have considered partnering with developers to provide power for e-bike stations during property reconstructions; however, this approach faces obstacles, such as a lack of capacity to undertake systematic reviews of development applications and varying developer interest.

Another important challenge raised was the placement of Bike Share stations, particularly in neighbourhoods with deployment gaps where space constraints due to narrow boulevards and limited on-street parking present challenges. While some businesses support bike-share stations taking up curbside space, others prioritize motor vehicle access for their customers. Bike Share Toronto is working to identify parking space reallocation opportunities to accommodate stations; however, stakeholders emphasized that more could be done to educate businesses on the economic development benefits of e-bike and TaaS options. More broadly, TaaS cluster stakeholders noted the need for improved municipal planning that leverages street space as effectively as possible. There is consensus in the industry that policies dictating on-street parking need to be more realistically aligned with the City's stated targets for micromobility use.

Industry members also noted the potential for R&D and innovation in Toronto, with suggestions for creating tech clusters or research zones to attract investment. The importance of managed innovation, collaboration with research institutes, and public sector support were all emphasized. Stakeholders expressed concerns that the City lacks sufficient dedicated spaces to advance innovation and attract investors to Toronto. Examples in neighbouring jurisdictions such as Hamilton (McMaster Innovation Park), Peterborough (Cleantech Commons) and Oshawa (Ontario Tech U) were highlighted. Companies reported working with academic partners outside of Toronto due to lacking a local innovation hub. Companies also noted the long-term role that innovation and research hubs play in workforce development, remarking that without prioritizing the attraction of local R&D, there's a risk that the local workforce will be primarily focused on lower-level business functions such as maintenance. Developing an R&D ecosystem will attract companies that can employ diverse, highly skilled positions.

Additionally, integration with the transit system and delivery and freight services are key growth opportunities. Industry members have observed successful transit-micromobility integrations in other jurisdictions worldwide and emphasized the need for ongoing collaboration between the City, TTC and TaaS companies.

Image: City bike lanes down a Toronto street.

6. Next Steps

The development of Toronto's Industry Growth Roadmap for the Sustainable Transportation Sector represents an important step toward reaching the targets in the City's NZS. By engaging a broad spectrum of stakeholders throughout the consultation process, the development of this roadmap identified key challenges and opportunities to grow Toronto's Micromobility, EV Charging, and Clean TaaS clusters. Implementation will require the City to maintain the momentum of stakeholder engagement and direct funding toward additional staff capacity and industry programming. Where necessary, recommendations may also need to adapt to emerging trends and be continuously evaluated to ensure effectiveness.

To build momentum, the sector's priority actions and first steps should be as follows.

Create a CMO for the Sustainable Transportation Sector

The first steps to create the CMO should involve:

- Establish a steering committee (City leaders and staff, academia, industry) to define the CMO's scope and objectives and develop a strategic plan with deliverables and key performance metrics.
- Establish a legal structure and governance framework (operational structure and board of directors).
- Develop a short-term funding strategy that is supported by City funding for staff, operations and early initiatives, and engage future funding partners (businesses, non-profit organizations, academic institutions, federal and provincial government).
- Focus on a few high-priority recommendations to demonstrate the CMO's value and secure early wins.
- Develop a brand strategy and stakeholder communication plan that engages the community and raises public awareness about the CMO's activities and goals.

Image: Rush hour at Toronto's busiest intersections near the Financial district.

Develop a Micromobility Deployment Strategy

The City's Transportation Services division is developing a micromobility strategy that focuses on regulations for micromobility modes of transportation. There are additional issues and opportunities outside the strategy's scope that need to be addressed in order for the City to meet its climate targets. A cohesive deployment strategy would build on the regulatory strategy by addressing many of the cluster priorities identified in the consultations for the roadmap: TTC integration; Bike Share coordination; parking challenges; building out the bike hubs; collaboration with property developers and BIAs; and more. The next steps should involve:

- Identifying a lead City division.
- Convening staff from divisions and agencies who engage in micromobility issues.
- Developing a project scope that pulls together input from this roadmap, Transportation Services' micromobility strategy and Toronto's Bike Industry Consultations & Priorities Report, among other existing resources. The project could use the model of the City's EV Strategy, which identified and established core actions needed to deploy EVs in Toronto.
- Engage existing bodies such as the Micromobility Industry Workforce Development Committee and cluster members for private sector feedback.
- Contracting a third party, assigning or hiring dedicated city staff to develop the strategy.

Image: Cyclists on the Humber Bay Arch Bridge in Toronto.

Establish a Regulatory Task Force

Stakeholders, particularly those from the EV Charging cluster, identified the need to convene a regulatory task force to identify and resolve regulatory issues limiting the growth of sustainable transportation solutions. The City should lead the task force (with a lead division to be identified internally) and involve key city divisions, along with industry, academia, and important city corporations (e.g., Toronto Hydro, TAF, Toronto Parking Authority). The task force could establish committees specific to each cluster and/or issue, which could convene separately. Initial opportunities for the task force would be to respond to the EV Charging cluster's request for a regulatory review, examine opportunities to regulate micromobility battery safety, and identify City levers to support bike parking and maintenance hubs in new building developments.

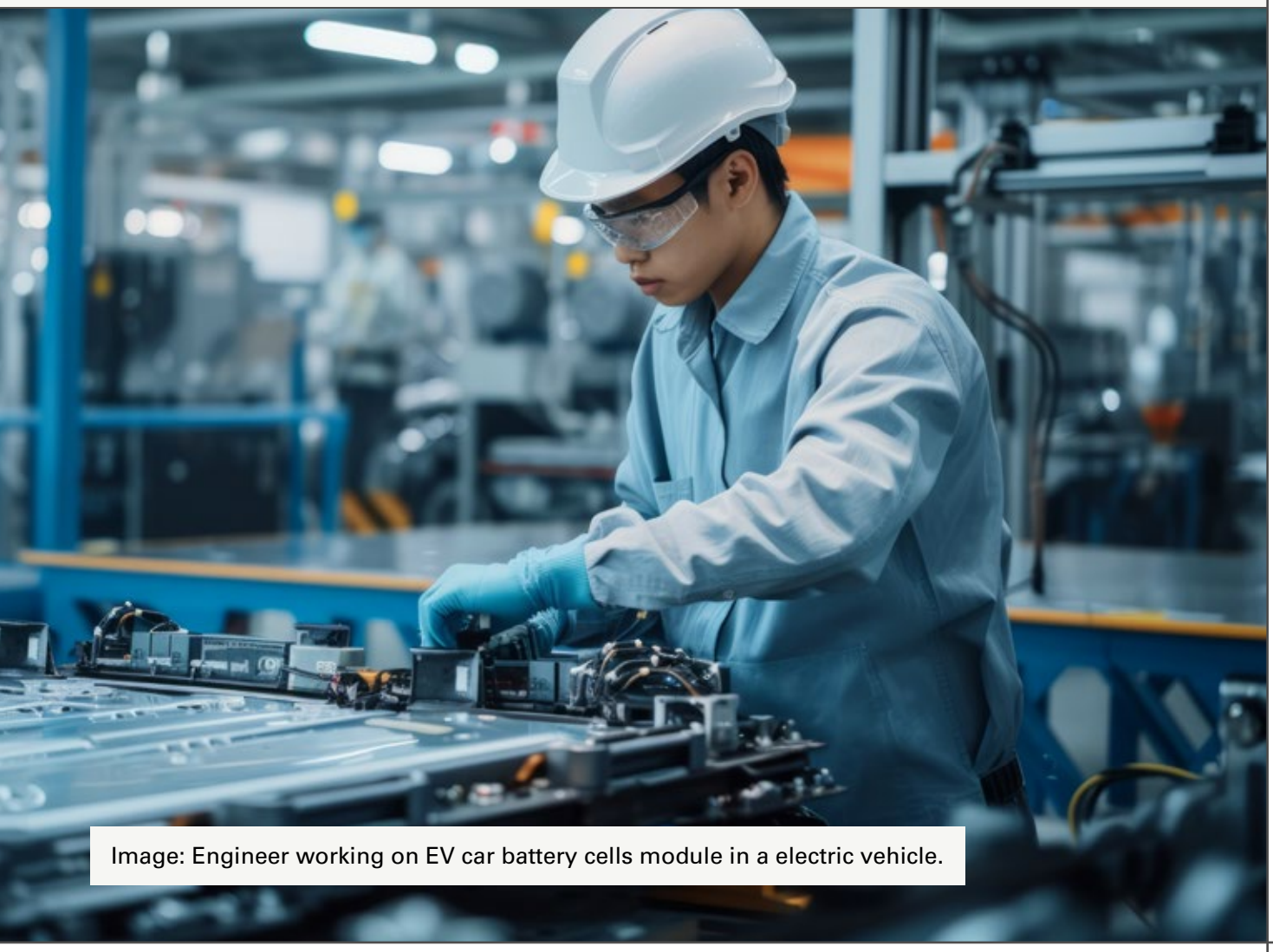


Image: Engineer working on EV car battery cells module in a electric vehicle.

Develop Cluster-Specific Promotion Plans

Marketing and promotion plans are valuable tools to advance opportunities identified in the roadmap. In the immediate term, while the CMO is being established, the City can kickstart sector promotion by tackling key issues highlighted by stakeholders in the roadmap consultations, such as: developing educational material to advance EV charger deployment in MURBs; marketing cycling as a positive source of economic development for local businesses; creating a "Better Way" marketing campaign to promote multi-modal travel using micromobility and transit; and generating workforce interest in critical sustainable transportation sector careers. This will require:

- Identifying a lead City division.
- Developing a communications strategy in collaboration with sector partners and drawing from existing initiatives such as the micromobility workforce attraction strategy.
- Developing marketing collateral (e.g., blogs, web content, guides, brochures, advertising campaigns).

Upon creation, the CMO can take over promotional activities for the sector.

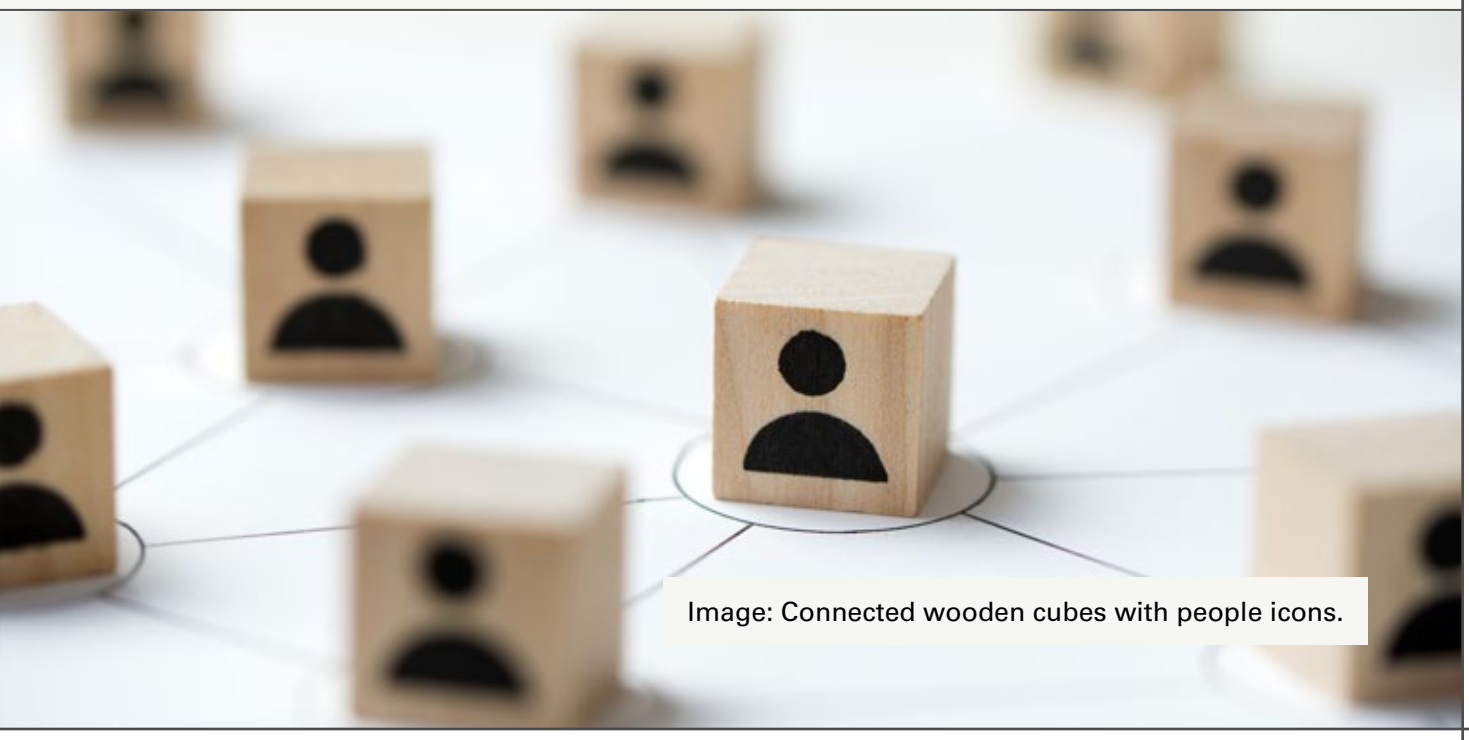


Image: Connected wooden cubes with people icons.

Advance Cluster-Specific Early Actions

Micromobility

Support the Micromobility Workforce Development Committee: The City and cluster should continue to work together to address the labour force challenges that face the cluster. This initiative provides national leadership, and continued support from the City is crucial to its success.

Expand Networking Opportunities for the Micromobility Cluster: Networking is an important first step to collaboration and innovation. The cluster needs to create additional networking opportunities for its members, similar to what other local green clusters have done. There is an opportunity for formal (e.g., EV & Charging Expo 2024) and informal events (e.g., Green Drinks, Blue Drinks Toronto).

EV Charging

Complete an EV Charging Market Forecast: EDC should undertake a market study of the local EV charging market to identify supply-side challenges, such as the labour force issues identified in this roadmap. Follow the example set by the "Economic Potential and Workforce Requirements in Toronto's Net Zero Strategy" report.

Clean TaaS

Promote TTC and Bike Share Toronto Engagement on Micromobility Issues: The TTC and Bike Share Toronto need more engagement on micromobility issues. There are multiple intersections between the TTC, Bike Share and the broader micromobility industry, including: bike parking; multimodal transportation opportunities; labour force challenges; and challenges in gaining traction at the federal level. Creating more collaboration opportunities, as described above, can build stronger connections between the largest sustainable transportation organizations and the rest of the sector.

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Image: Aerial view of downtown Toronto.

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