

# CANADIAN URBAN MOBILITY 2.0

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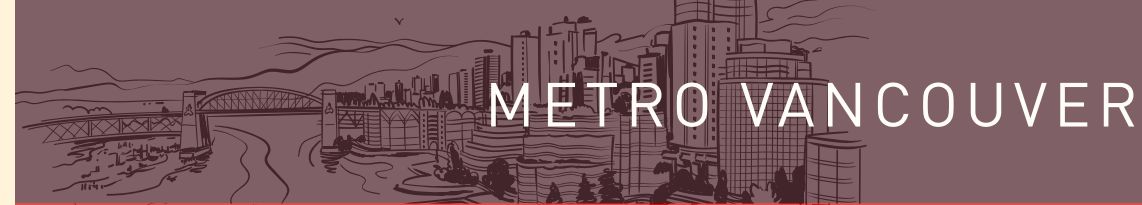
**How Prepared Are Canadian  
Municipalities to Facilitate  
Mobility Innovation?**

PREPARED FOR TRANSPORT CANADA  
FEBRUARY 2022



Transport  
Canada

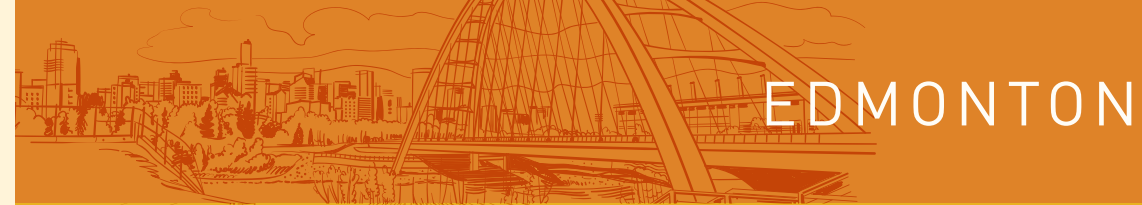
Transports  
Canada



METRO VANCOUVER



CALGARY



EDMONTON



WINNIPEG



GREATER TORONTO



OTTAWA-GATINEAU



GREATER MONTREAL



HALIFAX

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# Executive Summary

**EVERY INDUSTRY IS AFFECTED** by new technologies, and the mobility sector is no different. Thanks to rapid advancements in recent years, including high-speed connectivity and mass electrification, as well as equally rapidly changing personal preferences, there is no shortage of new ways for urban dwellers to move around their environments. With a wave of mobility innovations looming—and, in some cases, already here—municipal, provincial, and federal governments across Canada have a significant role to play in ensuring that their populations receive the full benefits. This report explores the question: How prepared are large Canadian municipalities in planning for, adopting, and advancing urban mobility innovations?

To answer this question, we performed a municipal policy scan for eight of the country's largest urban centres, including regulatory documents, policy documents and guidelines, council reports, and budgets. Provincial policy scans were also performed in cases where policy interdependencies were identified. Next, we interviewed more than two dozen key municipal urban planning and transportation planning staff for added firsthand perspectives. Finally, we created a new tool called the Municipal Mobility Index, which maps how municipalities currently use transportation projects to support sustainability, innovate with technology, and advance the public good.

After analyzing all of this information, we were heartened to see innovations already happening in urban mobility from coast to coast, in various ways and to various degrees. Our recommendations are based on what we learned in our research, and are intended to provide valuable direction for planning professionals not just in Canada, but around the world. These recommendations include: putting the public interest before that of private entities, building strong internal and external relationships to grow innovation locally, and fostering overall cultures of innovation that spur creativity and create new opportunities for advancing urban mobility.

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## HOW TO CITE THIS REPORT

Faid, J., Kapitsila, B., & Cooper, D. (2022). *Canadian Urban Mobility 2.0*. Transport Canada.

# Table of Contents

	<b>Introduction</b> _____	04
	<b>Metro Vancouver</b> _____	07
	<b>Calgary</b> _____	16
	<b>Edmonton</b> _____	26
	<b>Winnipeg</b> _____	36
	<b>Greater Toronto</b> _____	46
	<b>Ottawa-Gatineau</b> _____	56
	<b>Greater Montreal</b> _____	66
	<b>Halifax Regional Municipality</b> _____	77
	<b>Conclusion</b> _____	87

## PROJECT TEAM



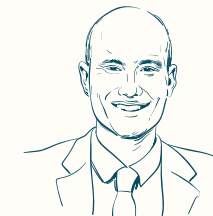
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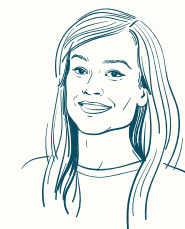
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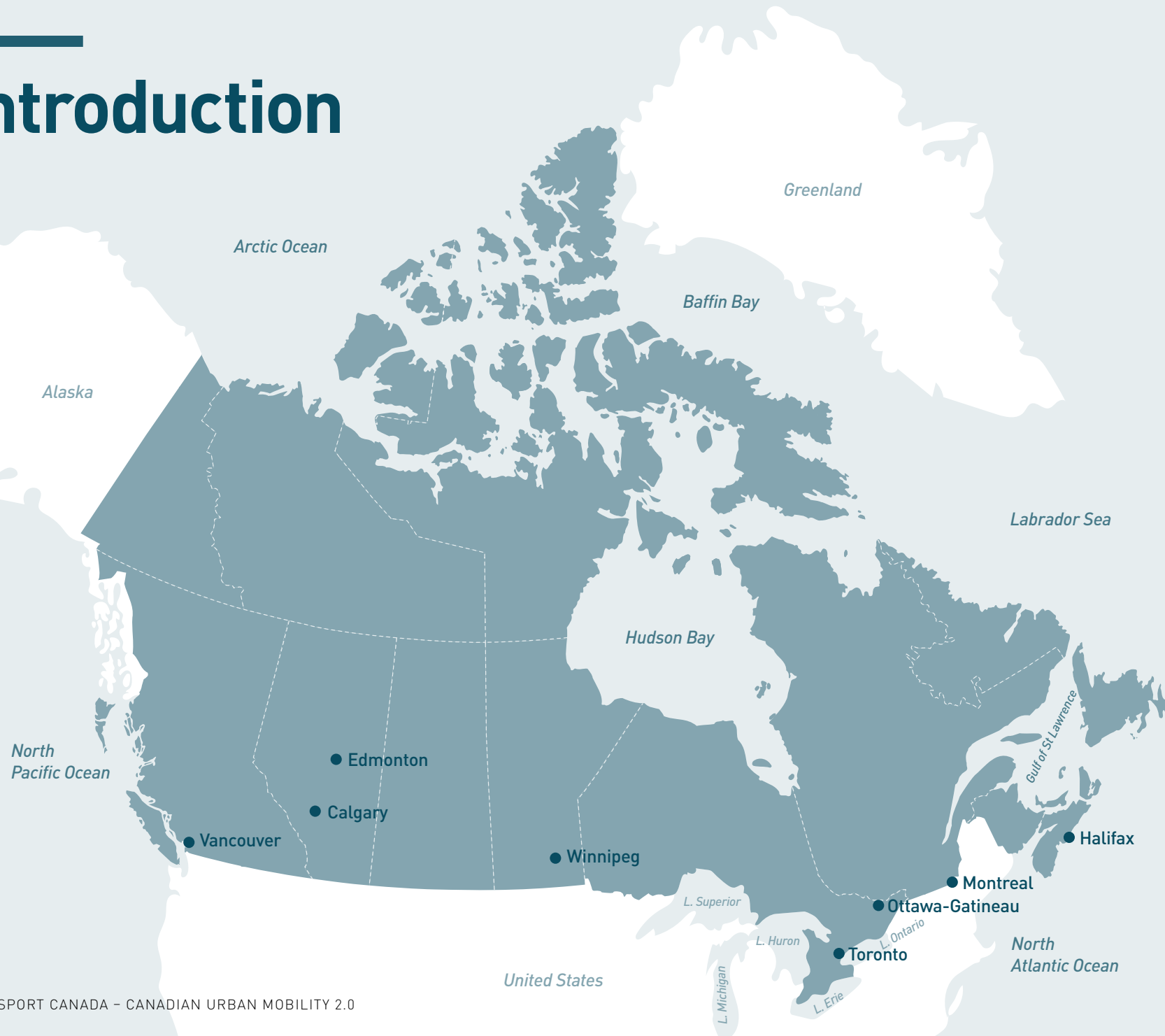
# INTRODUCTION

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## Purpose and Methods



# Introduction



## BACKGROUND

Every industry is affected by new technologies, and the mobility sector is no different. Thanks to rapid advancements in recent years, including high-speed connectivity and mass electrification, as well as equally rapidly changing personal preferences, there is no shortage of new ways for urban dwellers to move around their environments. These cutting-edge technologies bring with them promises of easier access, increased efficiency, and more inclusivity—but they also carry new challenges. The COVID-19 pandemic, meanwhile, has upended many of our established mobility habits in favour of remote work, virtual school, and curbside delivery, and its effects will likely be felt for many more years to come.

With a wave of mobility innovations looming—and, in some cases, already here—municipal, provincial, and federal governments across Canada have a significant role to play in ensuring that their populations receive the full benefits. This role requires finding a balance between regulatory interests (such as risk and safety) and growing calls from citizens for more consumer choice in how we get around. But there is much that we still don't know. Where do Canadian municipalities actually stand when it comes to planning for, using, and delivering the promised benefits of urban-mobility innovations? Are their urban planners preparing adequately? Which municipalities are forging ahead with innovative applications, and who's waiting to see what happens elsewhere? And, most importantly, do Canadian municipalities truly understand the unique opportunities and challenges they face, which, if handled correctly, can help lead the way towards transport systems that are more relevant, resilient, sustainable and accessible than ever?



# Introduction

## PURPOSE AND METHODS

This report explores the following primary research question: How prepared are large Canadian municipalities in planning for, adopting, and advancing urban mobility innovations?

It also seeks to answer a number of secondary research concerns, including the current state of urban mobility innovations across Canada's largest urban centres, the risks and rewards of investing in innovative mobility tactics, relevant challenges and opportunities, potential partnerships, the role of equity and accessibility, and how COVID-19 has affected municipalities' work on mobility innovation to date.

For the purposes of this report, "mobility innovations" is an intentionally broad concept that includes things like shared mobility (TNCs, car sharing, bike and scooter share), transit innovations (on-demand transit, electronic fare connection, electrification, and mobility as a service), and autonomous and connected vehicle technology.

In terms of methodology, each municipality covered in this report was studied along several lines. First, we performed a municipal policy scan, including regulatory documents, policy documents and guidelines, council reports, and budgets. Provincial policy scans were also performed in cases where policy interde-

pendencies were identified. Next, we interviewed key municipal urban planning and transportation planning staff, for added, firsthand perspective on how urban mobility innovations are explored, assessed, and designed. (A full list of staff consulted is available in the Appendix.) Finally, each municipality was given a SWOT analysis, which provides a broad, easy-to-digest assessment of its specific strengths, weaknesses, opportunities, and threats.

## MOBILITY INNOVATION INDEX

The Mobility Innovation Index is a framework, created especially for this report, that maps how municipalities use transportation projects to support sustainability, innovate with technology, and advance the public good. However, it is important to note that the index does not evaluate the nature or success of these initiatives, as we understand that they are developed in response to the needs, aspirations, and challenges of each particular community. Moreover, we acknowledge that each municipality exists in a unique geographic, historical, governance, and institutional context, which means that it is difficult to compare similar projects and initiatives in different jurisdictions. Nevertheless, the Mobility Innovation Index provides a basic and easy-to-understand overview of the diversity of mobility-innovation programs in Canada.

## THREE WAYS TO READ THIS REPORT

This report was written for planning, policy, and operations professionals both in Canada and abroad, with an eye on providing not just an overview of mobility innovations, but also a larger context for the challenges and potential solutions for the future of urban mobility.

Given the report's practical nature, as well as the diverse audience it intends to inform, we have presented our findings in different ways. The intention is to provide the maximum information possible in whatever amount of time that a reader intends to spend with it, with three suggested levels of engagement:

**3 MINUTES:** The fastest way to identify a particular program or initiative is to use the **Mobility Innovation Index**, which maps the relative progress of each municipality as it relates to transportation innovation and references specific projects discussed elsewhere in more detail.

**30 MINUTES:** For those interested in general trends, we have summarized our findings and identified mobility-innovation strengths and weaknesses for each municipality (**SWOT**).

**3 HOURS:** The complete text of the report provides a full review of mobility-innovation practices for each municipality under discussion.

# METRO VANCOUVER

**POPULATION** | CITY: 631,486 / REGION: 2,463,431 (2015) <sup>1</sup>

**AREA** | CITY: 114.97 km<sup>2</sup> / REGION: 2,882.68 km<sup>2</sup> <sup>2</sup>

**POPULATION DENSITY** | CITY: 5,492.6 p/km<sup>2</sup> / REGION: 854.6 p/km<sup>2</sup> <sup>3</sup>

**MEDIAN HOUSEHOLD INCOME** | CITY: \$65,327 / REGION: \$72,662 <sup>4</sup>

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## The Region by the Sea

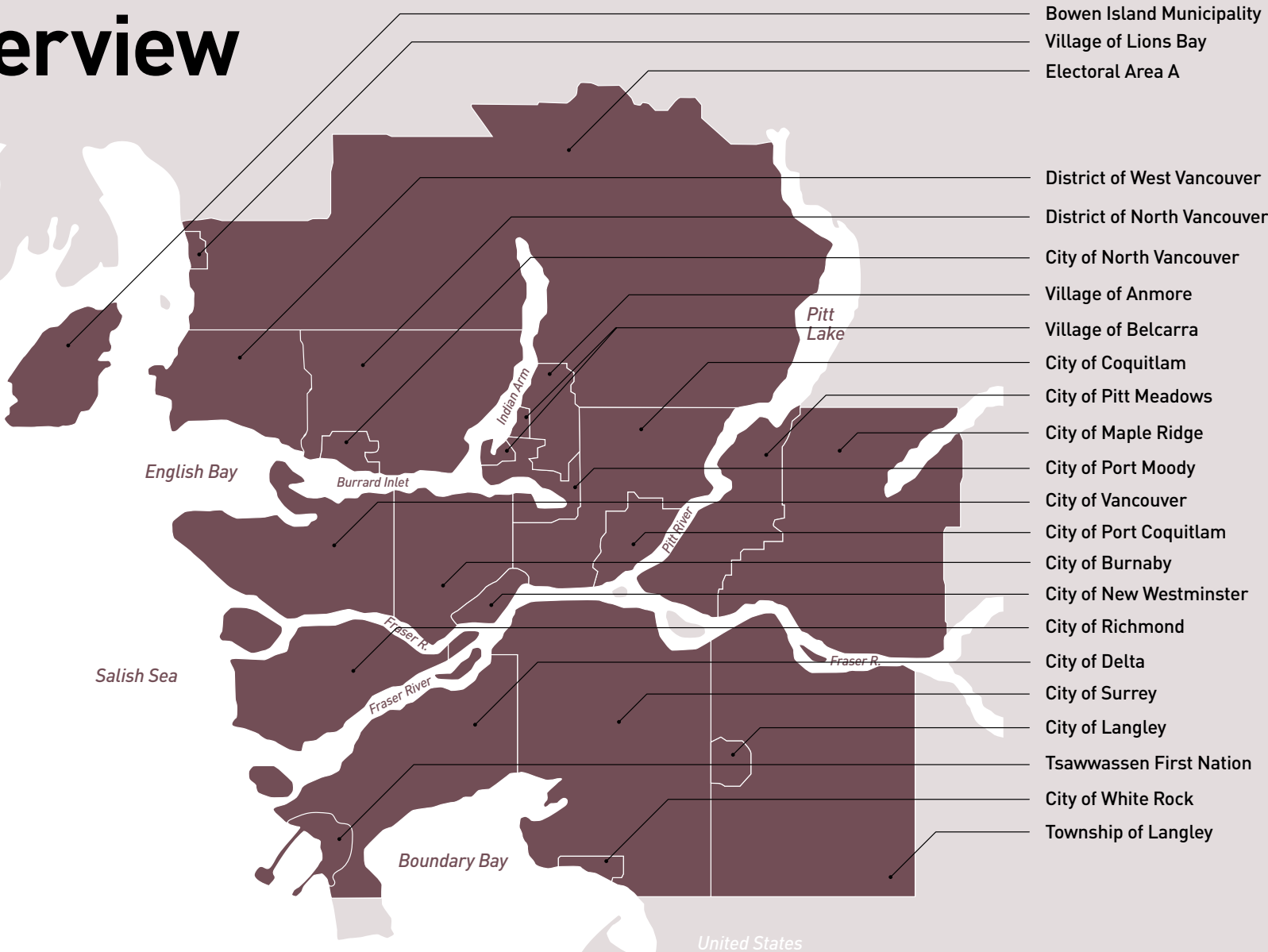


# Vancouver Overview

The City of Vancouver is located in the Lower Mainland region of British Columbia, along the west coast of Canada.

It is located on the unceded territories of the xʷməθkʷəy̓əm (Musqueam), Sk̓wx̓wú7mesh (Squamish), and Selilwitulh (Tseil-Waututh) Nations. Vancouver is the most populated city in the province, as well as the centre of a larger metropolitan region known as Metro Vancouver. In addition to being a coastal city, Vancouver is actually bordered by water on three sides: to the west, by the Strait of Georgia; to the north, by the Burrard Inlet; and to the south, by the Fraser River. The spatial limits of this unique coastal geography have created a more urgent emphasis on density in urban planning, which has led to Vancouver having the highest population density of any municipality in Canada.<sup>5</sup> City planners encouraged high-rise developments in the city's West End as early as the 1950s; today, the majority of the city consists of dense and walkable neighbourhoods.

The region of Metro Vancouver consists of 21 municipalities (including the City of Vancouver), the Tsawwassen First Nation, and an unincorporated area called Electoral Area A.





# Vancouver Mobility Overview

**WITHIN THE CITY** of Vancouver, motor vehicles are the most popular mode of transportation, with 86% of residents reporting access to a private vehicle and 49% using cars, trucks, or vans as their primary mode of transportation, either as a driver or passenger.<sup>6</sup> This tendency is more pronounced in the larger Metro Vancouver area, where 67.6% of residents commute primarily via motor vehicle.

Public transit is also a popular method of transportation, serving as the main way of commuting for 29.7% of people in the City of Vancouver, and 21.4% of people in all of Metro Vancouver.<sup>7</sup> Options for public transit include buses, the SkyTrain (an LRT system with 70.3 km of dedicated track), the SeaBus (a passenger ferry), the West Coast Express (a commuter

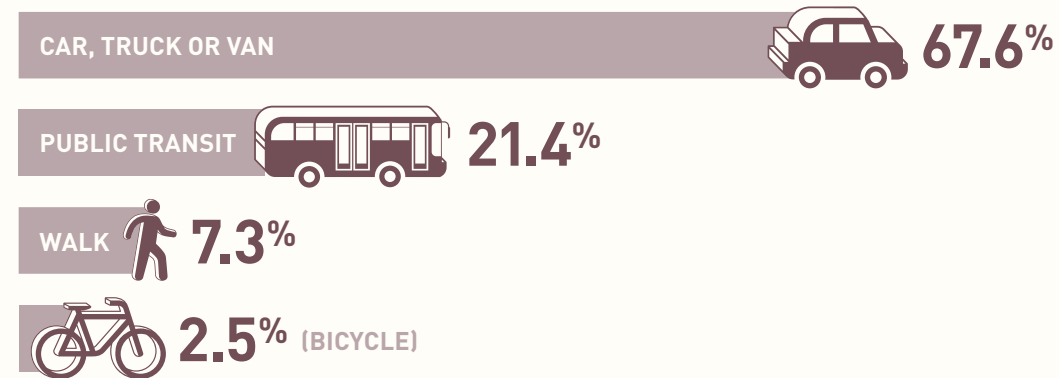
railway connecting Metro Vancouver to surrounding municipalities), and HandyDART (paratransit). When it opened in 1985, the SkyTrain was the first fully automated rapid-transit system in the world, and remains one of the most extensive. A monthly public-transit pass costs between \$100 and \$181 depending on the number of zones travelled. Public transit for all of Metro Vancouver is operated by the South Coast British Columbia Transportation Authority, commonly known as TransLink. TransLink is the only multimodal regional transportation authority in Canada and only one of two in North America.

The City of Vancouver also has multiple shared mobility options. The most popular of these is carsharing, which is offered by several private companies. As of

2019, 37% of city residents are members of at least one carsharing service, which is a 3% increase from the previous year.<sup>8</sup> Another micromobility option is bikesharing, operated privately by Mobi by ShawGo, and which 4% of total residents have registered for.

Planners with Metro Vancouver describe the region's approach to innovation as "cautious incrementalism," gradually building on top of a transit system that is already robust compared to other Canadian municipalities. The region tries to learn from what other jurisdictions have implemented before proceeding with its own innovations. Planners also look to ensure that any new transportation solutions implemented do not do so at the expense of the region's overall goals of health, safety, access, and equity.

## MAIN MODES OF COMMUTING IN METRO VANCOUVER (2016 CENSUS)



**“Metro Vancouver has a cautious-incrementalism approach to innovation.”**

– A VANCOUVER PLANNER EXPLAINING WHY THE REGION DOESN'T RUSH INTO NEW INNOVATIONS

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# Vancouver Innovations

## MOTOR VEHICLES

The City of Vancouver has taken active steps to reduce car dependency among its residents. As of 2019, Vancouver has eliminated parking minimums for new developments, and created new parking maximums.<sup>9</sup> In November 2020, the City of Vancouver adopted its Climate Emergency Action Plan, which requires all new non-residential buildings to include electric-vehicle infrastructure, to increase access to public charging stations, and to develop a zero-emission parking plan.<sup>10</sup> As of 2021, autonomous vehicles are not allowed on roads anywhere in British Columbia; however, a delivery company has performed an unauthorized driver-supervised test in the Metro Vancouver region.<sup>11</sup> Finally, the City of Vancouver has completed a feasibility study of on-street electric vehicle charging from light poles,<sup>12</sup> as well as a curbside vehicle pilot program that explored charging options in residential areas.<sup>13</sup>

The City of Vancouver has one of the most progressive carsharing policies in North America.<sup>14</sup> All shared cars receive up to two free hours of on-street parking, while shared zero-emission vehicles are exempt from annual permit fees.<sup>15</sup> Select SkyTrain stations, meanwhile, have dedicated parking spaces for carsharing.<sup>16</sup> In 2019, ride-hailing services were authorized to begin operating in Vancouver, with 19% of residents using the service in the first ten months.<sup>17</sup>

## PUBLIC TRANSIT

As a region, Metro Vancouver has taken active steps towards mobility innovation in public transit. TransLink's Battery-Electric Bus Program, which is a partnership with the Canadian Urban Transit Research & Innovation Consortium (CUTRIC), the Government of Canada, and BC Hydro, is the first interoperable charging pilot in the world.<sup>18</sup> TransLink also has an extensive Low Carbon Fleet Strategy, which recommends an aggressive conversion program to purchase 677 electric buses by the end of the decade.<sup>19</sup> The agency is only procuring battery-electric buses from this point forward.

In 2019, TransLink tested on-demand transit services on nearby Bowen Island, which could be accessed by phone, or via an app on a smartphone or personal computer.<sup>20</sup> In recent years TransLink has also incorporated artificial intelligence into its trip-planning service and is currently developing a pilot project for areas that are difficult to access via other means.<sup>21</sup> Finally, as of fall 2021, children aged 12 years and under will be eligible to ride all public transit in British Columbia for free.<sup>22</sup>

## ACTIVE MODES AND MICROMOBILITY

The City of Vancouver has given incentives to developers to create more bicycle storage and carshare-specific parking in new developments. Because the province requires all bicycle riders to wear a helmet, each bicycle rental in the City's Mobi by ShawGo bikeshare system includes a helmet.<sup>23</sup> In 2020, the City of North Vancouver approved a multi-year pilot program for e-bike sharing, which is the first of its kind in the province.<sup>24</sup> Beginning in June 2021, the City of Vancouver is running a pilot to use electric cargo bikes for short-range urban deliveries as an alternative to trucks.<sup>25</sup> In 2021 the Province of British Columbia also approved a three-year electric-scooter pilot with six participating municipalities, including four in Metro Vancouver.<sup>26</sup>

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**47%**  
of users in the Bowen  
Island pilot used  
on-demand transit  
instead of driving.

(TRANSLINK)

# Vancouver

## Other Factors

### ACCESSIBILITY

The City of Vancouver has considered ways of improving accessibility by collaborating with private taxi companies. The city's *Transportation 2040* plan considers using taxis for paratransit services to save costs and increase efficiency.<sup>27</sup> In 2016, 10.8% of HandyDART trips were already provided through taxi companies.<sup>28</sup> Overall, the share of wheelchair-accessible taxis in the City of Vancouver increased by 41% from 2011 to 2017, and taxi companies across Metro Vancouver accept TaxiSaver coupons provided by TransLink.<sup>29</sup>

Planners with Metro Vancouver are aware that new technologies can have accidental bias against and negative consequences for particular groups, such as payment structures that require the use of smartphones, or facial-recognition software that is less accurate for people with darker skin. They recognize that accessibility must always be carefully considered when making these decisions.

### MODE INTEGRATION

The *Transportation 2040* plan calls for full integration of cycling into the city's transit system, including public transit—bicycles are currently not allowed on SkyTrains due to crowding—and taxis.<sup>30</sup> In 2019, TransLink partnered with carshare and bikeshare operators to test its Shared Mobility Pilot by integrat-

ing transit, carshare and bikeshare services, and billing into one Shared Mobility Compass Card.<sup>31</sup> The first phase of the pilot ran from October 2019 to August 2020 and received high support among its participants, concluding that integration leads to a shift to more environmentally friendly modes of mobility. The Shared Mobility Pilot received Canada's Clean50 Top Project Award, and its second phase was set to be launched in 2021.<sup>32</sup>

### PARTNERSHIPS

TransLink partnered in 2019 with carshare providers Evo Car Share and Modo Co-operative, and bikeshare operator Mobi by ShawGo, to test its Shared Mobility Pilot.<sup>33</sup> Its Battery-Electric Bus Program is also a partnership, with the Canadian Urban Transit Research & Innovation Consortium (CUTRIC), the Government of Canada, and BC Hydro. TransLink has also hosted mobility forums and held open calls for innovation, which sought partnerships and pilot projects with private industry.

Planners with Metro Vancouver say there are benefits to partnering with private industry, but are aware that there are questions of sustainability if the company suddenly goes out of business, leading to an immediate gap in services. They are also aware that private companies are focused on profit first, and not necessarily serving the entire region's needs.

### MOBILITY FINANCE

The Mobility Pricing Independent Commission, which is composed of 14 representatives from across Metro Vancouver, led a study that resulted in two concepts for alleviating congestion and increasing equity among residents: point charges at important crossings, and establishing different mobility zones with varying distance-based charges.<sup>34</sup> As part of its Climate Emergency Action Plan, the City of Vancouver is also studying mobility pricing for its Metro Core (downtown and central Broadway).<sup>35</sup>

### COVID-19

Metro Vancouver has responded to the recent COVID-19 pandemic by becoming, in November 2020, the first transit system in North America to test copper and organosilane surfaces for sanitation purposes.<sup>36</sup> In March 2021, TransLink tested photocatalytic oxidation (PCO), a technology largely used in the food and hospitality industries, as a means of sanitizing the air and surfaces on select buses.<sup>37</sup> To further enhance the safety and well-being of its residents, the City of Vancouver has also pledged to dedicate 11% (approximately 220 km) of its road network to walking, active modes of transportation, and public spaces—a significant increase from the 12 km already implemented as of May 2020.<sup>38</sup>

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# Vancouver Challenges

## GENERAL ISSUES

The City of Vancouver's *Transportation 2040* plan acknowledges several transportation-related challenges, including high demand for its road network and public-transit system, an aging population that is expected to bring changes in overall travel patterns, rising fuel prices, existing fuel dependency, and climate change.<sup>39</sup>

## ACCESSIBILITY

Although approximately 19% of taxis in Metro Vancouver are accessible, this figure does not include ride-hailing services, as they are not currently subject to Passenger Transportation Board requirements.<sup>40</sup>

## BUREAUCRACY

Metro Vancouver is a complex region that includes 21 municipalities, one Treaty First Nation, and one Electoral Area. This network requires collaboration and communication between all stakeholders, led by the shared Mayors' Council on Regional Transportation. On a provincial level, planners say the B.C. government has been helpful in many ways, including helping regulate private companies looking to enter the mobility market, thereby taking pressure off the region to act too quickly. However, this relationship can come at a cost, as projects are unlikely to gain traction with planners if the province doesn't already see them as priorities.

## MODE INTEGRATION

The *Transportation 2040* plan aimed to integrate private ferries operating in False Creek, in downtown Vancouver, with the TransLink Compass Card, existing transit stops, and active transportation;<sup>41</sup> however, this has not yet been achieved.

## DATA CONTROL

Access to data is a complex issue. Cutting-edge digital information can be used to improve and refine services, but municipalities must also be careful to protect user privacy and security. Ride-hailing and micro-mobility companies are required to share real-time data with local governments, which can be used to make future decisions based on transit demand. In Metro Vancouver, TransLink was the subject of a cyberattack in December 2020, which led to a number of information and data systems being shut down. Planners believe cybersecurity is an increasingly important issue as technology becomes more embedded than ever in most people's lives.

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**“Technology needs to fit our needs. We don't really want to fit our needs to technology.”**

– A VANCOUVER PLANNER DESCRIBING THE REGION'S PEOPLE-FIRST APPROACH TO MOBILITY

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**39%**  
**congestion level  
in Vancouver.**

(TOMTOM, 2019)

# Vancouver SWOT Analysis



## STRENGTHS

- A single regional transportation authority has robust control over the multimodal system, which allows for measured approaches to new innovations and partnerships with private mobility providers.
- Forward-thinking approaches to land use and transportation has created a balance of transportation modes throughout the region and has prevented the region from becoming over-reliant on single-occupancy vehicles.



## WEAKNESSES

- The cautious approach taken by the public sector to regulating new transportation services puts the region behind the rest of Canada in accessing the benefits those services bring.
- The region's dense compact development and high ridership has led to significant congestion on Metro Vancouver's road and transit networks.
- Municipalities within the region are taking an individual approach to micromobility, which creates inconsistent access to services, data collection and information sharing, leading to a non-integrated and fragmented micromobility landscape.



## OPPORTUNITIES

- A strong system of introducing new innovations from academic and private sectors could help keep the region abreast of new possibilities.
- High standards of living and the presence of two of Canada's top universities can attract new talent and resources to bring more mobility innovations to the region.



## THREATS

- High cost of housing and gentrification may force more people to live in areas without diverse transportation options, leading to more private-vehicle travel across the region.
- The pace of, and sequential approach to, transit development has not kept up with demand in the region, which might impede its continuous development in the future.

# Vancouver Municipal Innovation Index

## ACTIONS AND POLICIES:

	Absent	Research	Plan	Pilot	Practice	
<b>SUPPORT SUSTAINABILITY</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Private vehicle electrification					█	<i>Policies that incentivize EVs</i>
Public transit electrification				█		<i>Battery-powered electric buses test</i>
Carshare					█	<i>Policies that incentivize carsharing</i>
Bikeshare					█	<i>Mobi by ShawGo</i>
Shared electric micromodes				█		<i>Pilot in 2021</i>
Mode integration				█		<i>TransLink Shared Mobility Pilot</i>
Smart land use					█	<i>Eliminated parking minimums</i>
<b>INNOVATE WITH TECHNOLOGY</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Vehicle-to-vehicle communication		█				<i>ACTIVE-AURORA Project</i>
Vehicle-to-infrastructure communication					█	<i>SkyTrain operation</i>
Autonomous technology			█			<i>The Future of Driving report</i>
On-demand transit service				█		<i>Transit On-Demand Pilot Program - Bowen Island</i>
Trip planning					█	<i>TransLink Trip Planner</i>
Smartfare					█	<i>Compass Card (Smartcard)</i>
Data sharing					█	<i>City of Vancouver public data portal</i>
<b>ADVANCE PUBLIC GOOD</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Equity					█	<i>TransLink TaxiSaver coupons</i>
Accessibility					█	<i>Taxi cab accessibility</i>
Public-private partnerships					█	<i>TransLink Open Calls for Innovations</i>
Health and safety				█		<i>TransLink copper and organosilane surfaces test</i>
Mobility pricing		█				<i>The Mobility Pricing Independent Commission</i>

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# CITY OF CALGARY

POPULATION | 1,239,220 (2015)

1

AREA | 825.56 km<sup>2</sup>

2

POPULATION DENSITY | 1,501.1 p/km<sup>2</sup>

3

MEDIAN HOUSEHOLD INCOME | \$97,334

4

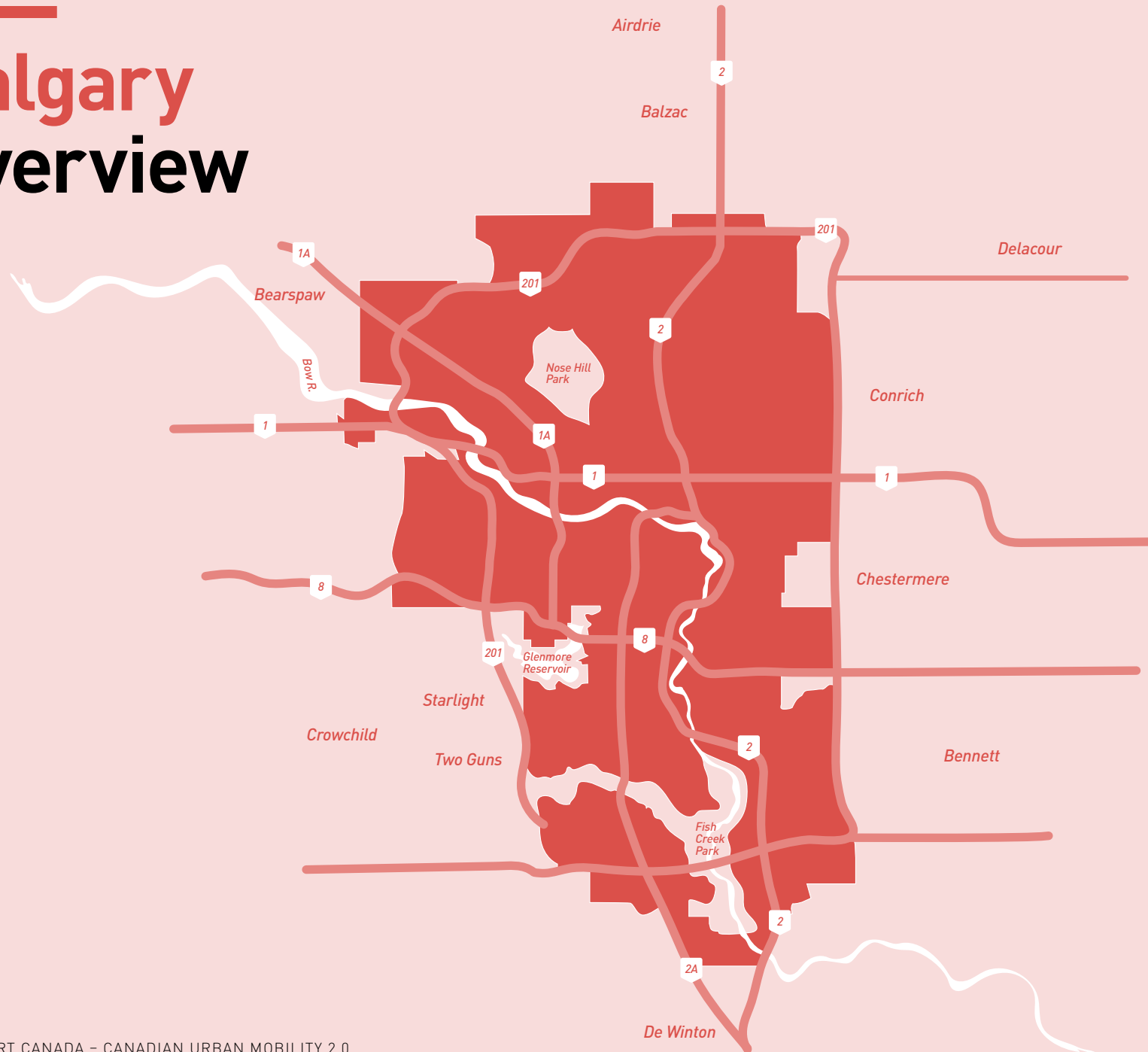
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## The Energy Heartland





# Calgary Overview



**Calgary is the largest city in Alberta, and the third-largest municipality in Canada.**

It is located in the southern half of the province, at the confluence of the Bow and Elbow Rivers, in Treaty 7 territory that is the traditional home of the Blackfoot Confederacy, the Îyâxe Nakoda and Tsuu T'ina nations, and the Métis Nation of Alberta, Region 3. Calgary is bordered by prairies on the north, south, and east; to the west of the city are foothills and, beyond that, the Rocky Mountains. Much like Edmonton, its neighbour to the north, Calgary exhibits urban sprawl in all directions, in large part due to its history of annexation and ongoing green-field development. In its early days, Calgary planning focused on a “uni-city” approach to its development, which prioritized downtown while ignoring diverse residential and commercial development in areas outside its core.<sup>5</sup> As the white-collar centre of Canada’s oil and gas industry, Calgary is home to many of the sector’s corporate head offices.

# Calgary Mobility Overview

**MOTOR VEHICLES ARE** the primary mode of transportation in Calgary, with 76.8% of residents commuting primarily via car, truck, or van as a driver or passenger.<sup>6</sup> Public transit, including buses and LRT, is also available, with another 15.4% of Calgarians choosing this as their main way of commuting. A transit pass in Calgary costs \$112 per month. Public transit is operated by Calgary Transit, owned and operated by the city.

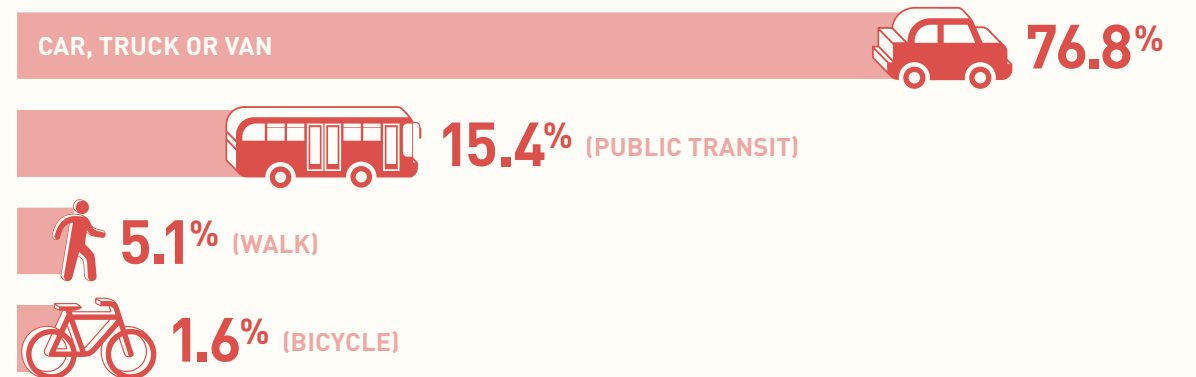
Calgary is also home to a private carsharing service. Approximately 1,800 Calgarians were members as of 2021.<sup>7</sup>

Planning professionals in Calgary say that the City generally embraces innovation when it comes to mobility. They report encouragement from council, staff, and the general public to press ahead with innovative ideas and technology, and to keep pace with other municipalities in Canada. They also believe the city's relatively simple structure, compared to larger regions like Metro Vancouver or Greater Toronto, allows them to be more agile when it comes to decision making.

**“We want to be innovative. Maybe not bleeding edge, but somewhere near the front of the edge, and at the same time having successful projects that deliver for our citizens.”**

– A CALGARY PLANNER DESCRIBING THE CITY'S APPROACH TO INNOVATION

## MAIN MODES OF COMMUTING IN CALGARY (2016 CENSUS)



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# Calgary Innovations

## MOTOR VEHICLES

In 2020, Calgary updated its Transportation Plan to put special emphasis on using existing infrastructure to move people, not vehicles, and proposed developing an additional 220-km network of high-occupancy vehicle lanes over the next 50 years.<sup>8</sup> To decrease congestion and the number of cars downtown, the City limits the number of parking stalls in new office towers to one stall per 140 m<sup>2</sup> of floor area.<sup>9</sup> In May 2021, Calgary's Platform Innovation Centre was completed, including a 503-space parking structure that can be converted to housing or commercial uses in the future, depending on demand.<sup>10</sup> Calgary uses traffic-lane reversals during rush hours, including on four streets that are connected to the City's Traffic Management Centre via fibre-optic cable.<sup>11</sup>

Calgary also uses modern technology to manage street parking, where downtown rates are the most expensive in Canada.<sup>12</sup> Its ParkPlus Mobile Photo Enforcement vehicles are able to record licence plates of parked cars, which an AI system then compares with the system's payment information. If no record of payment for that vehicle is found, then a human operator double-checks the information and issues a ticket.<sup>13</sup> In 2016, Calgary became the first city in the world to incorporate fully autonomous parking payment with its partnership with PayBySky, a private company that tracks vehicle locations and makes automatic payments through their owners' Calgary Parking Authority ParkPlus account.<sup>14</sup>

Public vehicles in Calgary can be tracked, too. The City has conducted a pilot, funded by the federal government's Program to Advance Connectivity and Automation in the Transportation System, to explore opportunities from vehicle-to-infrastructure technology.<sup>15</sup> Calgary currently uses wireless technology to more efficiently manage and maintain more than 2,500 vehicles in its fleet.<sup>16</sup>

Calgary doesn't currently offer incentives to electric-vehicle owners, and is one of the least-likely places for electric vehicles to be purchased in Canada.<sup>17</sup> However, the City does have an electric-vehicle strategy, and has co-commissioned (with Edmonton) a study on residential and commercial infrastructure for vehicle charging.<sup>18</sup> There are approximately 175 electric-vehicle charging stations in the city, and Calgary has partnered with other groups and municipalities to create the Peak to Prairies network of 20 charging stations across southern Alberta.

Carsharing has been available in Calgary since 2012, though the vendors have changed over time. A 2016 study found that each carsharing vehicle took the equivalent of 11 private vehicles off the City's roads, and reduced overall greenhouse-gas emissions by 14 metric tons.<sup>20</sup> In 2019, Calgary was deemed by the carsharing vendor Car2Go to be one of its most successful markets, with more than 134,000 active users.<sup>21</sup> Despite this, Car2Go left the market in 2019, and was replaced by Communauto the following year.

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# 94%

of households in  
Calgary have access  
to private vehicles.

(2015 CALGARY ANNUAL TRANSPORTATION SURVEY)

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# Calgary Innovations (continued)

## PUBLIC TRANSIT

Since 2012, Calgary's city operations have run primarily on electricity generated from renewable sources, and its LRT network is powered by wind energy.<sup>22</sup> In 2019, the City invested significantly in new natural-gas buses and a natural-gas transit garage.<sup>23</sup> Calgary's Computer-Aided Dispatch/Automated Vehicle Location system provides information on transit arrivals in real time.<sup>24</sup>

In addition to its regular bus network, Calgary operates a crosstown express-service network called MAX, where buses run every 12–18 minutes during rush hours and 20–30 minutes off-peak. MAX buses have signal priority and queue jumps at intersections, while their stations are equipped with heating, CCTV, and advanced lighting systems. There are currently four MAX lines in operation.<sup>25</sup>

Calgary Transit accepts contactless, cash-free payment through a dedicated app called MyFare. The program was rolled out in summer 2020, in response to health concerns related to the COVID-19 pandemic, but was in the works for several years beforehand.<sup>26</sup> Beginning in 2021, students at universities and colleges in Calgary will be also able to access their student-transit passes through MyFare.<sup>27</sup>

In 2019, Calgary ran a pilot for on-demand transit services in two new communities that had no fixed transit routes. Its preliminary findings indicated that on-demand services were a viable option for newly developed neighbourhoods before fixed-route offer-

ings could be fully implemented.<sup>28</sup> In 2020, on-demand transit services were introduced as a cost-saving measure to several communities in southwest Calgary, replacing four community shuttle routes.<sup>29</sup>

## ACTIVE MODES AND MICROMOBILITY

Calgary has had a cycling strategy since 2011, and commits 1.1% of its annual transportation budget towards funding it.<sup>30</sup> As a result, the City has seen bicycle ridership grow, cyclist use of downtown sidewalks decline, and overwhelming support among Calgarians to continue developing the City's cycling network.<sup>31</sup> After the flood in June 2013, Calgary opened 13 park-and-bike locations, making bicycles one of the most reliable modes of transportation in the early days following the disaster.<sup>32</sup>

Calgary's shared e-scooter program is considered one of the best in North America due to the high number of trips per device. From 2018–20, the City conducted an e-bike and e-scooter pilot program in collaboration with three private vendors, which attracted 200,000 unique riders and totalled nearly two million trips.<sup>33</sup> At the mid-term evaluation, the pilot led to three innovations that were introduced in 2020: special parking zones for electric two-wheelers, slower speed limits (15 km/h maximum, compared to the 20 km/h the technology allows) in high-pedestrian areas, and fines for improper and careless riding. In 2021, Calgary's City Council made the pilot a permanent program.<sup>34</sup>

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# 14

electric community shuttles will be in service in Calgary as of 2022.

(CBC)

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# Calgary

## Other Factors

### SHARED MODES

In 2020, Calgary's Transportation Department began exploring innovations related to shared transportation modes, including additional space for electric-vehicle infrastructure and parking at park-and-ride stations; e-scooter, bikeshare and carshare zones at LRT stations; continued exploration of on-demand transit services; and potential updates to the city's transit app to include shared and multi-modal options.<sup>35</sup>

### PARTNERSHIPS

Given how much land and infrastructure the City owns, Calgary is open to collaborating with private, public, and academic institutions to test projects and ideas in the real-world environment through its Living Labs initiative. In 2018, Calgary conducted the first autonomous-vehicle shuttle pilot in Western Canada, between the Zoo LRT Station and the Telus World of Science.<sup>36</sup> Other collaborations to date include flight areas for drones and remote-sensing technologies.<sup>37</sup>

The City has also partnered with the University of Calgary's Wearable Technology Research and Collaboration (We-TRAC) training program to monitor the stress level and heart rates of cyclists at various points in the City's cycling network. This project is intended to help identify improvements in the existing network, and to help shape the design of future projects going forward.<sup>38</sup>

### SCENARIO PLANNING

In 2009 and 2020, Calgary conducted scenario-planning exercises to evaluate the effectiveness and calculate potential savings from its Municipal Development Plan and Transportation Plan, which emphasize the importance of compact development. The 2020 evaluation projected a reduction in expenditures for roads by 28% and for public transit by 4% over the next 60 years, when compared to uncontrolled city development.<sup>39</sup>

### ECONOMIC STIMULUS

Planning professionals noted that the City of Calgary has made diversifying its economy away from the oil-and-gas industry a major priority in recent years. This has led to an added appetite for innovation, in mobility and other sectors, since even smaller-scale projects can provide a welcome boost to the city's economy.

### AUTONOMOUS DELIVERIES

A Calgary-based company called Dianomix is developing autonomous delivery robots specifically designed for last-mile grocery transportation. Dianomix's current model can handle 10 bags per trip while travelling at a speed of 5 km/h on a sidewalk. This is the first vehicle of its kind to be approved for public testing by the City of Calgary and the provincial Ministry of Transportation. Trials of the technology have been completed, and a pilot is being planned with select Calgary businesses for spring or summer 2022.<sup>40</sup>

### NEIGHBOURHOOD SPEED REDUCTIONS

As of May 31, 2021, the maximum speed on Calgary's residential and collector roads was reduced to 40 km/h. This decision was made by City Council in order to reduce the number of collisions in the city, with a specific target of decreasing the number of bicycle and pedestrian collisions by 12%. With this move, Calgary joins other cities in Alberta, including Airdrie, Banff, and Edmonton, that have already adopted the same limit.<sup>41 42</sup>

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# 1,500

shared e-scooters were allowed in Calgary in 2021.

(CITY OF CALGARY)

# Calgary Challenges

## SPRAWL

Calgary's population and area have nearly doubled in the last 35 years, with the majority of growth over the past decade occurring at the city's edges. This sprawl creates challenges for ensuring public transit and other services remain efficient, which in turn leads to residents of these communities relying predominantly on motor vehicles and an increased demand for the roads that lead downtown and to other employment areas.<sup>43</sup>

## BUREAUCRACY

Planning professionals in Calgary must ensure that their work is in accordance with the provincial Traffic Safety Act. Some planners expressed frustration at the limits of this legislation, which they feel does not capture the rapidly changing realities of modern transportation, including new technology like sidewalk-delivery robots. They also expressed a desire for more clearly defined roles in collaborations between municipal, provincial, and federal governments.

## TRANSIT FUNDING

Calgary's transit budget was strained even before the COVID-19 pandemic. As a result of a reduction in business property taxes in 2019, the City covered a \$60-million gap in its public-transit budget by cutting 80,000 service hours in Calgary Transit operations. During the early months of the pandemic, Calgary received emergency-operations funding from the provincial and federal governments through the Safe Restart Agreement to maintain transit service during the acute stage of the pandemic.<sup>45</sup> Planning professionals report that, as a result of the COVID-19 pandemic, ridership on Calgary Transit fell by 30%.

There have also been several delays to the City's LRT system, particularly to its Green Line extension, which has seen the beginning of its construction work delayed due to an 86% cut in provincial funding for 2019–23.<sup>46,47</sup>

## ELECTRIFICATION OF BUSES

The City has been hesitant to convert buses to electric power. As of 2018, Calgary Transit operated approximately one thousand buses, 85% of which ran on diesel and the remainder using gasoline. The City had previously announced an effort to start converting half of the total fleet to natural gas.<sup>48</sup> However, Calgary Transit has recently undertaken an electrification study to pilot electric-battery buses in the near future and in June 2021 announced the purchase of 14 battery-electric community shuttles.<sup>49</sup>

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**“We aren't necessarily able to take big risks or put big money into things until we can prove the business case. Being a public entity, we have to be very careful about spending our money. And that's a bit of a hurdle when it comes to new technology.”**

– A CALGARY PLANNING DISCUSSING SOME OF THE CHALLENGES THEY FACE WHEN IMPLEMENTING NEW INNOVATIONS

# Calgary SWOT Analysis



## STRENGTHS

- Calgary has experience using technology to manage traffic lanes, parking stalls, and the City's vehicle fleet.
- It is the leading example in Canada for successfully regulating, deploying, and adjusting shared dockless micromobility modes like e-scooters and bikes.
- The unicity governance model streamlines decision-making to undertake mobility innovations.



## WEAKNESSES

- Calgary's initial decision to focus on converting transit buses to natural gas makes the shift to electrification more challenging.
- The City had issues with transit operating funding even before COVID-19 caused a decrease in ridership, and thus revenue.



## OPPORTUNITIES

- Calgary's Living Labs initiative provides access to City-owned land and infrastructure for private, public, and academic institutions to test ideas in a real-world environment.
- A dedicated share of the City's transportation budget goes to infrastructure for active modes, which can increase the safety and convenience of their use.



## THREATS

- Challenges in securing provincial support for the City's transit system has delayed the planned expansion of its LRT system, particularly the Green Line LRT project.
- Despite ongoing efforts, Calgary continues to sprawl, which results in the loss of the natural environment and more pollution from transportation; meanwhile, the 2013 flood revealed the City's vulnerability to natural disasters.

# Calgary Municipal Innovation Index

## ACTIONS AND POLICIES:





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# CITY OF EDMONTON

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## The Gateway to the North

POPULATION | 932,546 (2015)

1

AREA | 685.25 km<sup>2</sup>

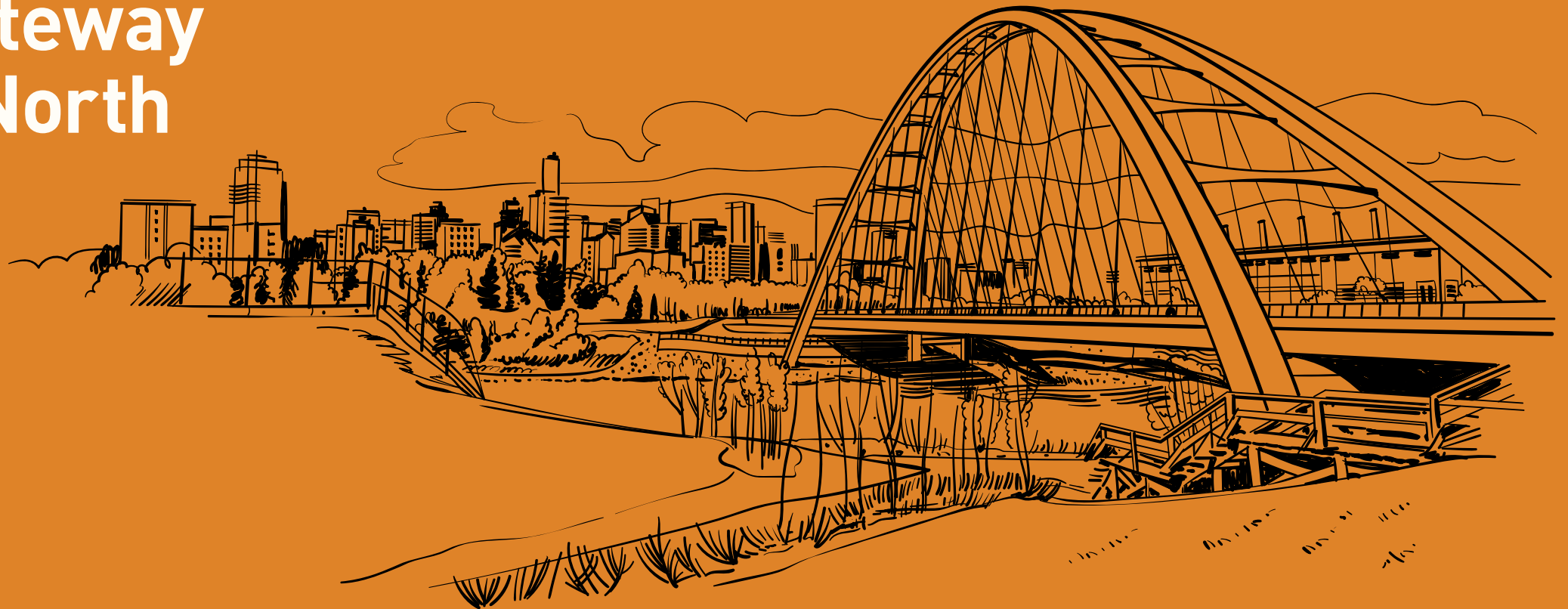
2

POPULATION DENSITY | 1,360.9 p/km<sup>2</sup>

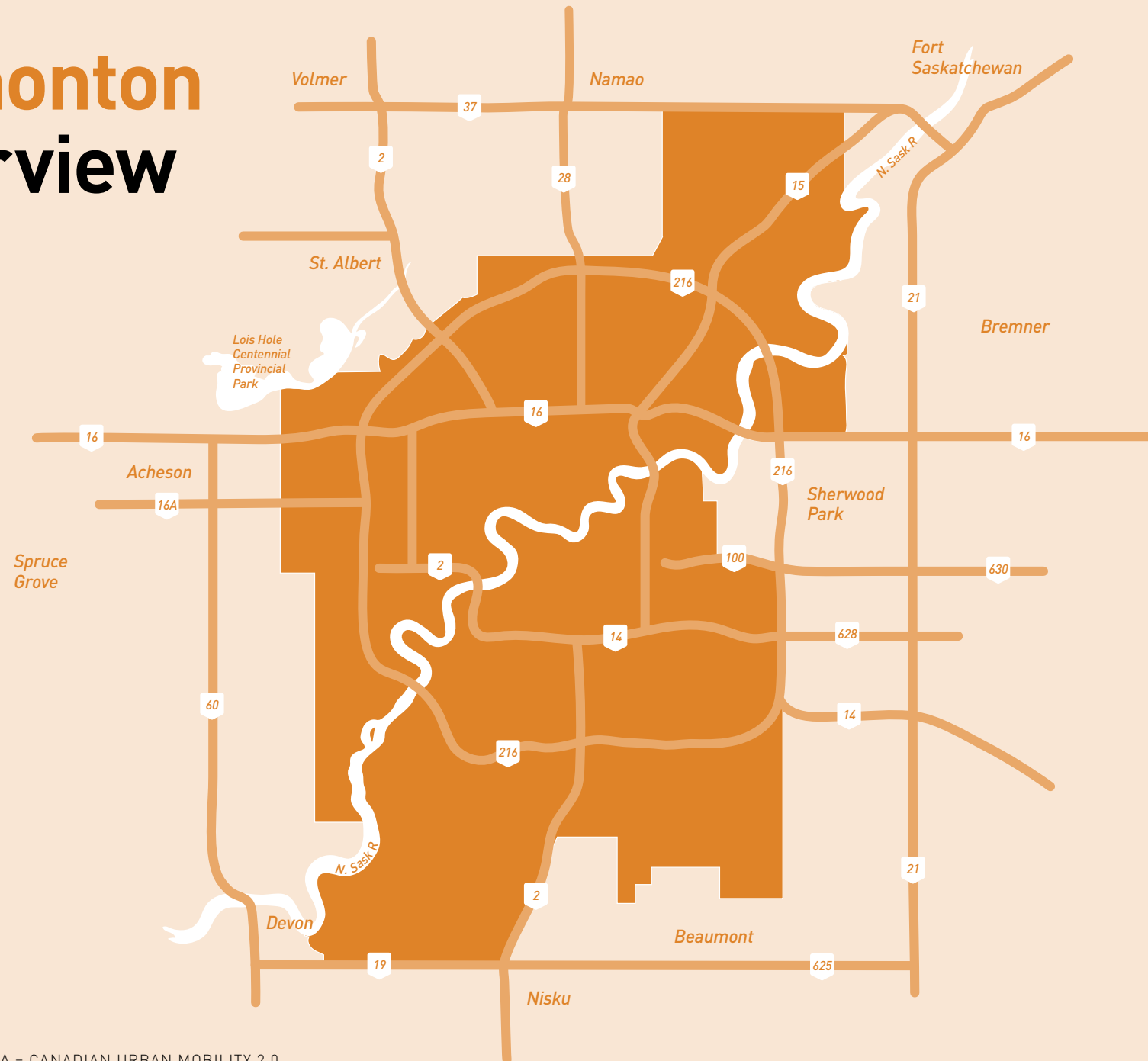
3

MEDIAN HOUSEHOLD INCOME | \$87,225

4



# Edmonton Overview



**The city of Edmonton is the capital of Alberta, and the northernmost major city in North America.**

It is also the centre of the larger Edmonton Metropolitan Region, which includes 13 municipalities in total. Edmonton is located on Treaty 6 territory, which is the traditional meeting ground, gathering place, and travelling route of the Nēhiyawak (Cree), Anishinaabe (Saulteaux), Niitsitapi (Blackfoot), Métis, Dene, and Nakota Sioux. Geographically, Edmonton is bisected by the North Saskatchewan River, and is surrounded on all sides by a flat prairie landscape. This geography has allowed the city to sprawl outward in all directions; in fact, much of Edmonton's growth has come from amalgamating nearby urban municipalities, including recent annexations of land south of the city. Historically, Edmonton has taken a somewhat laissez-faire approach to municipal planning, not introducing its first municipal plan until 1963. This is one of the reasons Edmonton currently has one of the lowest population densities of any major city in Canada. At the same time, Edmonton was the first city in North America to build a Light Rail Transit system, with the first line opening to the public in 1978.

# Edmonton Mobility Overview

**MOTOR VEHICLES ARE** the dominant mode of transportation in Edmonton, with 82% of residents commuting primarily via car, truck, or van.<sup>5</sup> Another 12% of Edmontonians commute via public transit, which includes buses and an LRT system. A public-transit pass costs \$100 per month. All public transit is operated by Edmonton Transit Service (ETS), which is owned by the city. Many of the adjacent municipalities are amalgamating their transit services into a new regional commission, which will be launching in 2022.

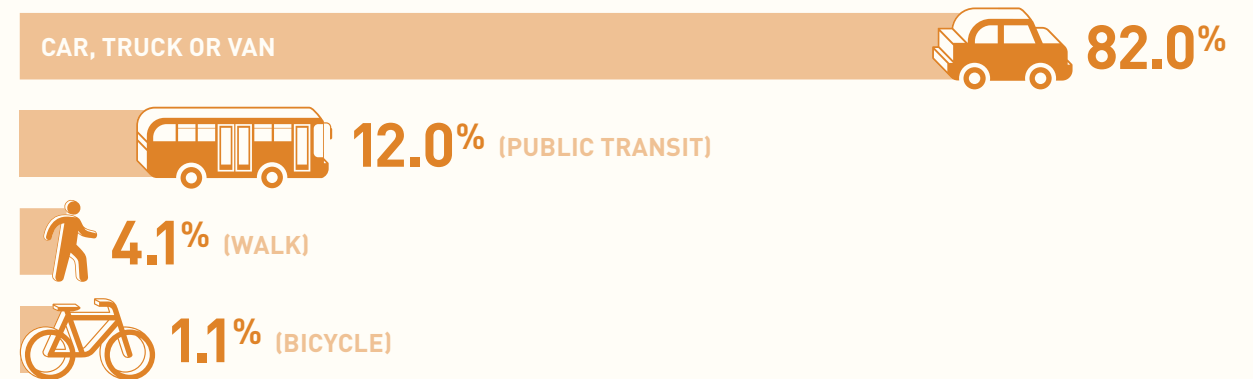
Edmonton also has select shared mobility options, including private carsharing services, which 1% of Edmontonians have registered for as of 2015.<sup>6</sup>

Planning professionals in Edmonton describe the City's approach to mobility as a combination of progressiveness and conservatism, forging ahead in certain areas while waiting and taking cues from fellow municipalities in other areas. They cite the City's commitment to public engagement, as well as the way it combines in-person engagement with robust open-data collection methods, as one key reason for its success in implementing its ideas.

**“It depends on the topic. In some of the areas we’re probably behind [in innovation], and some areas we’re probably leading the country.”**

– AN EDMONTON PLANNER WHEN ASKED HOW INNOVATIVE THE CITY IS WHEN IT COMES TO MOBILITY

## MAIN MODES OF COMMUTING IN EDMONTON (2016 CENSUS)



# Edmonton Innovations

## MOTOR VEHICLES

Despite its reliance on motor vehicles, Edmonton has taken measures to improve efficiency and safety on its roads. In 2018, the City adopted its Smart Transportation Action Plan, which explored how new transportation technologies can help the City achieve its strategic objectives.<sup>7</sup> In 2020, Edmonton became the first Canadian city to complete an Adaptive Traffic Signal Control pilot to help improve traffic flow.<sup>8</sup> The City uses automated safety devices at intersections and speed-enforcement vehicles to support Vision Zero, a strategy that aims to eliminate fatalities on the city's roads.<sup>9</sup> Edmonton's photo-radar mobile units have also been rebranded in order to be more visible to the public.<sup>10</sup>

Going forward, Edmonton has committed to building only smart-traffic-signal infrastructure,<sup>11</sup> with 400 smart streetlights (complete with traffic-monitoring cameras and light-sensing photocells) already installed around the city.<sup>12</sup> It has also been a testbed for connected-vehicles technology.<sup>13</sup> In 2011, Edmonton was the only Canadian city to receive IBM's Smarter Cities Challenge prize, which included a set of recommendations on how information technology can improve the city's transportation system.<sup>14</sup> And in 2020 Edmonton became the first major municipality in North America to eliminate parking-minimum requirements on new developments citywide, which encourages the use of more sustainable modes of transportation.<sup>15</sup>

The City of Edmonton has produced several transportation-planning documents that support electrification, including the 2013 Energy Transition Strategy, which emphasizes electric vehicles as a way of reducing emissions;<sup>16</sup> an updated version of this strategy projects a reduction in overall emissions by 28% through improvements in transportation in city planning.<sup>17</sup> Edmonton adopted its Electric Vehicle Strategy in 2018,<sup>18</sup> and partnered with the neighbouring city of Calgary to commission a study on residential and commercial infrastructure for electric-vehicle charging.<sup>19</sup> Edmonton also has a rebate program that reimburses some of the costs of installing charging stations for residential areas and existing commercial properties.<sup>20</sup>

## PUBLIC TRANSIT

In April 2021, Edmonton launched its redesigned bus network, which aims to provide more frequent service along the main city corridors. The new network is supplemented with the largest on-demand transit fleet in Canada (57 shuttles connecting 37 neighbourhoods with nearby transit centres), which will be free for riders for the next two years.<sup>21</sup> The Edmonton International Airport has also signed a Memorandum of Understanding with NTT Data, a Tokyo-based IT company, and Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development (JOIN) in a pilot to test five on-demand buses in EIA's Airport City.<sup>22</sup>

**“We settled on the side of more choices being good for the consumer and more mobility options being a net positive. And I think that's borne out.”**

**– MAYOR IVESON DISCUSSING THE CITY'S APPROACH TO MOBILITY PARTNERSHIPS WITH PRIVATE BUSINESSES**

# Edmonton Innovations (continued)

ETS uses Smart Bus technology to share real-time service information with its patrons. By 2017, more than 900 buses were supplied with geolocation devices, CCTV cameras, data terminals, and automated passenger counters.<sup>23</sup>

Edmonton has the second largest battery-bus program in Canada, and was the first in the country to perform overhead charging at their own garage. From 2014–2016, the City performed a series of trial runs confirming that electric buses are a viable replacement for diesel buses, even during Edmonton’s extreme winter temperatures.<sup>24 25</sup> There are currently 40 electric-battery buses in service, with 20 more on order.<sup>26</sup>

The City of Edmonton has partnered with the University of Alberta and Pacific Western Transportation to test a shared autonomous shuttle on city streets and to educate the public about the potential of this new technology.<sup>27</sup> The City has commissioned a larger study on autonomous vehicles,

with the majority of its recommendations focusing on the ways that automated technology can improve the efficiency of public transit.<sup>28</sup>

To improve efficiency across the Metro Edmonton region, in 2020 the Province of Alberta approved the development of a Regional Transit Services Commission for the region’s eight municipalities.<sup>29</sup> Edmonton has also introduced its Arc program (formerly called Smart Fare), which allows for electronic payments and regional fare integration; it also makes ETS the first transit agency in Canada to introduce fare capping.<sup>30</sup> The first phase of this program will launch in fall 2021.<sup>31</sup>

## ACTIVE MODES AND MICROMOBILITY

According to its planning documents, the City of Edmonton expects active modes of transportation to become more popular in the city, given the rising temperatures caused by global warming.<sup>32</sup> The City’s

bicycle and pedestrian networks are continually being expanded, with new sidewalks and trails introduced next to the new Valley Line LRT expansion. Active modes of transportation are also encouraged at the new Tawatinâ LRT bridge, which won’t be accessible by car.<sup>33</sup> Planning professionals in the City are particularly pleased with the speed at which the downtown bicycle network was implemented, and hope to use that project’s success as a model for other such projects in the future.

Edmonton was one of the first cities in Canada to permit shared e-scooters, with a pilot conducted in summer 2019 with two vendors, and is the only city in the country to have an open permit process for them. The e-scooter pilot was postponed in 2020, due to the COVID-19 pandemic, but returned in 2021 with three vendors, with a new speed cap on Jasper Avenue and new no-ride zones surrounding MacEwan University and parkland preservation areas.<sup>34 35</sup>

**“If you give people a safe space to do it, they will go out and use it. If you build it, they will come.”**

– MAYOR IVESON DISCUSSING THE ADDITIONAL MIXED USE SPACE ADDED BY THE CITY DURING THE COVID-19 PANDEMIC

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# Edmonton

## Other Factors

### EQUITY

In 2015, Edmonton became the first major Canadian municipality to adopt the Vision Zero strategy. As part of the strategy's update in 2020, the City used the Gender-based Analysis Plus approach to assess disparities in mobility for different groups of people.<sup>36</sup> It is currently using a similar equity lens to look at zoning and bylaws.

### PARTNERSHIPS

Edmonton has been a part of the ACTIVE-AURORA partnership—an effort to test the potential of connected vehicle technology in Western Canada—since 2014. The project is a partnership between the University of Alberta and the University of British Columbia, supported by Transport Canada, the Government of Alberta, and the City of Edmonton.<sup>37</sup> The City has consulted transportation academics and professionals from around the globe to help shape its Smart Transportation Action Plan.<sup>38</sup> Edmonton has also collaborated with the University of Alberta in the MetroLab Network, an international community of municipalities and educational institutions focused on public-sector innovation.<sup>39</sup> Finally, the Valley Line Southeast LRT, which is currently under construction, is the first such project to be built as a Public-Private Partnership (P3) with TransEd Partners.

### BUREAUCRACY

The City of Edmonton is unusual amongst Canadian municipalities in that it does not have a dedicated transportation department. Instead, transportation matters are handled across a variety of departments according to job function. Planning professionals believe this leads to a more integrated strategy, as transportation work is by default more collaborative and less siloed. As part of a province-led initiative, Edmonton has also participated in a red-tape reduction strategy, which some feel has reduced regulation within city government and led to a more efficient workflow.

### POTENTIAL INCREASES TO THE COST OF DRIVING

The 2020 update to Edmonton's city plan targeted a 50% share for public transit in the city's future modal split.<sup>40</sup> The City is currently studying ways to achieve this target, including increasing vehicle registration and parking costs, raising fuel taxes, introducing tolls, and closing select central city corridors to cars.<sup>41</sup>

### INTER-CITY TRANSPORTATION

Alberta Transportation has signed a memorandum of understanding with TransPod, a Canadian company that develops hyperloop technology, to connect Edmonton and Calgary. The provincial government has not yet made any financial commitment to the project; however, TransPod hopes to complete a feasibility study by 2022, finalize development by 2024, and break ground on construction in 2025.<sup>42</sup> Studies suggest that connecting Alberta's two largest cities via high-speed rail could provide an economic benefit.<sup>43</sup>

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# 70+

smart-technology units in three congested corridors, as part of the ACTIVE-AURORA partnership.

(STANTEC)

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# Edmonton Challenges

## AGING POPULATION

As the number of residents aged 65+ is expected to increase in the coming years, the City understands that general travel patterns in Edmonton will also change. As such, the city's transportation system will need to adapt to accommodate both the increase of seniors who choose to drive and those who will choose alternative modes of transportation.<sup>44</sup>

## OUTWARD GROWTH AND INCREASE IN VKT

Many Edmontonians prefer suburban-style living and the mobility of a personal car. This has led to Edmonton's vehicle-kilometres travelled (VKT) rate outpacing the growth of its population by more than half from 1994 to 2005—an increase of 32% and 13%, respectively.<sup>45</sup> As a result, Edmontonians travel longer distances, along roads that are increasingly congested, and have their well-being negatively affected by lower physical mobility, lower air quality, increased risk of injury from collisions, and strained mental health.<sup>46</sup>

## STARTUPS

In 2018, Edmonton joined the Startup in Residence program (STIR). This program, which began in San Francisco in 2014, is a four-month collaboration between the public sector and local startup community aimed at using technology to solve societal challenges.<sup>47</sup>

## EV AND CARSHARING INCENTIVES

Edmonton's electric vehicle charger rebate program provides financial incentives for commercial and residential buildings to purchase and install EV charging stations. The City had a similar rebate program for e-bikes, but it was suspended after one year due to budget constraints.<sup>48</sup>

Edmonton's Energy Transition Strategy supported the idea of carsharing in the city in 2013,<sup>49</sup> leading to locally owned Pogo carshare launching in 2014, which joined the Communauto Group in 2018. Despite years of discussion, as well as numerous calls for it in City planning documents, Edmonton still does not have a bikeshare program.<sup>50</sup>

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# 18

tonnes of GHG emissions per capita, making Edmonton's pollution rate one of the highest in the world.

(CITY OF EDMONTON)



# Edmonton SWOT Analysis



## STRENGTHS

- A proven history of being the first in Canada, or even North America, to implement new policies and projects: a modern LRT system (1970s), abolishing parking minimums (2020), and the largest on-demand fleet in Canada (2021).
- Commitment to the expansion of zero-emission public transit.
- Transportation projects are beginning to include social inclusion, equity, and a cleaner environment as strategic outcomes of their implementation.



## WEAKNESSES

- Decades of car-oriented development create challenges for getting uptake on alternative and more sustainable modes of transportation.
- Mode integration is still in the research stage and smart-fare implementation has taken longer to accomplish than initially anticipated.
- Transit amalgamation was achieved slowly and does not yet include all regional partners.



## OPPORTUNITIES

- Over the last five years Edmonton has updated or developed an array of planning documents that should substantially advance its transportation network when fully implemented.
- Partnerships with the University of Alberta in artificial intelligence and machine learning position the City at the forefront of testing and deploying cutting-edge transportation projects.
- Two MOUs have been signed with the provincial government to explore both hyperloop and high-speed rail technologies between Edmonton and Calgary.



## THREATS

- Continued sprawl makes cost-effective and easily accessible public transit difficult to implement and operate in all parts of the city.
- Upcoming changes in the City's political leadership can affect which transportation projects move forward, and which will be replaced with other priorities.

# Edmonton Municipal Innovation Index

## ACTIONS AND POLICIES:

	Absent	Research	Plan	Pilot	Practice	
<b>SUPPORT SUSTAINABILITY</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Private vehicle electrification				█		<i>EV Curbside Charging Pilot</i>
Public transit electrification					█	<i>40 electric buses since 2020</i>
Carshare			█			<i>Energy Transition Strategy</i>
Bikeshare			█			<i>Energy Transition Strategy</i>
Shared electric micromodes				█		<i>Shared e-scooter pilot program</i>
Mode integration		█				<i>Edmonton Smart Transportation Action Plan</i>
Smart land use					█	<i>Eliminated parking minimums</i>
<b>INNOVATE WITH TECHNOLOGY</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Vehicle-to-vehicle communication				█		<i>ACTIVE-AURORA Project</i>
Vehicle-to-infrastructure communication				█		<i>ACTIVE-AURORA Project</i>
Autonomous technology				█		<i>2018 Autonomous Vehicle Pilot</i>
On-demand transit service					█	<i>Service started on April 25, 2021</i>
Trip planning					█	<i>ETS Trip Planner</i>
Smartfare				█		<i>Phased deployment of Smart Fare system</i>
Data sharing					█	<i>City of Edmonton's Open Data Portal</i>
<b>ADVANCE PUBLIC GOOD</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Equity			█			<i>Gender-Based Analysis Plus use in traffic safety</i>
Accessibility			█			<i>Edmonton Smart Transportation Action Plan</i>
Public-private partnerships					█	<i>MetroLab Network</i>
Health and safety					█	<i>Vision Zero implementation</i>
Mobility pricing		█				<i>Transit Mode Share: Increase and Impacts</i>

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# CITY OF WINNIPEG

The Gateway  
to the West

POPULATION | 705,244 (2015)

1

AREA | 464.33 km<sup>2</sup>

2

POPULATION DENSITY | 1,518.8 p/km<sup>2</sup>

3

MEDIAN HOUSEHOLD INCOME | \$68,402

4



# Winnipeg Overview



**Winnipeg is the capital of Manitoba, as well as the largest city in the province.**

It is located on Treaty One territory, in lands that are the traditional heartland of the Métis people. Winnipeg is located at the junction of the Red and Assiniboine Rivers, and situated near the longitudinal centre of the country. In the early years of the 20th century, Winnipeg was one of the fastest-growing cities in North America, thanks to the arrival of the Canadian Pacific Railway and the city's unique access to the country's western provinces and northern territories. This rate of growth continued until the opening of the Panama Canal in 1919, which lessened the railway's importance in international trade and commerce. The city's most famous intersection is the historic Portage Avenue and Main Street (which currently has no pedestrian crossings at street level), and Winnipeg as a whole is noteworthy for being built in a radial pattern, rather than a grid, which gives the city unique challenges and opportunities when it comes to future planning.

# Winnipeg Mobility Overview

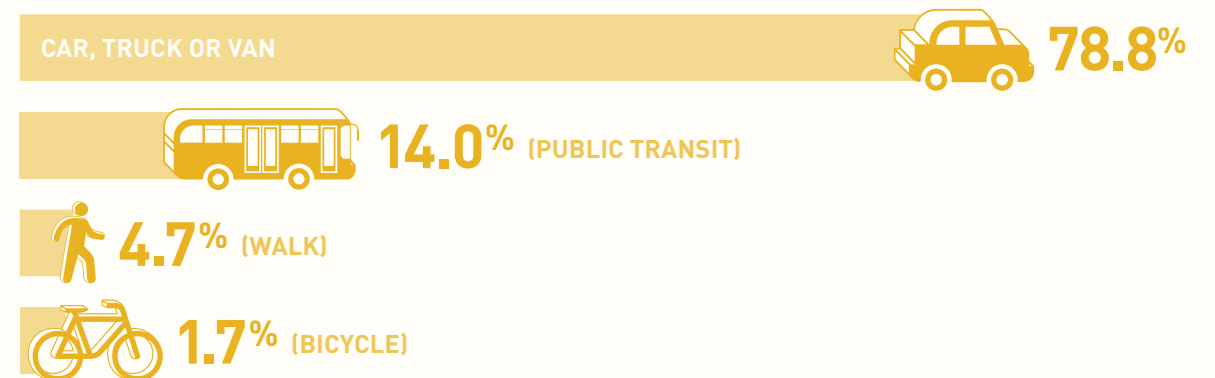
**MOTOR VEHICLES ARE** the standard mode of transportation in Winnipeg, with 78.8% of residents commuting primarily via car, truck, or van.<sup>5</sup> Another 14% of residents commute via public transit (buses). In Winnipeg, a monthly transit pass costs \$104. Public transit is operated and overseen by Winnipeg Transit, which is owned by the municipal government.

Planners in Winnipeg report a city culture that has a history of innovation, but one primarily geared towards motor vehicles. Mobility innovations in other areas often lag behind other Canadian municipalities, with a transit system that has remained largely static over time. The City of Winnipeg's overall approach to planning tends to be laissez-faire, as seen in the fact that the City is only now drafting its first-ever comprehensive transportation master plan. At the same time, Winnipeg has ramped up its approach in recent years, adding significant capacity to its planning department. The City also has a dedicated Department of Innovation, Transformation & Technology.

**“I think Winnipeg has a history of being innovative, but unfortunately a lot of that has been under the paradigm of being innovative to achieve traffic flow in an environment that wasn't built for it.”**

– A WINNIPEG PLANNER DESCRIBING THE CITY'S HISTORY OF INNOVATION

## MAIN MODES OF COMMUTING IN WINNIPEG (2016 CENSUS)



# Winnipeg Innovations

## MOTOR VEHICLES

Winnipeg has a Transportation Management Centre, which is connected to all 650 signalized intersections in the city via cellular modems. The centre can adjust signal timing anywhere in the city in response to traffic alerts received from sensors, its signals-management system, 70 CCTV cameras, and the smart-phone app Waze.<sup>6</sup>

To achieve the goals of the City's Climate Action Plan, Winnipeg started its Carshare Parking Permit Pilot Project in 2019, allocating six on-street stalls and one off-street stall for vehicles from the local Peg City Car Co-op (PCCC) to park for free.<sup>7</sup> The PCCC has also partnered with private developers, who can provide a permanent parking spot for a shared vehicle in exchange for a density bonus or reduced-parking requirement from the City. This arrangement has allowed the PCCC to expand its fleet by 12 cars in 2021.<sup>8</sup>

In 2017, the Winnipeg Fleet Management Agency Pilot Project received nearly \$200,000 from the

City's innovation fund to test the feasibility and cost-effectiveness of electric vehicles.<sup>9</sup> As of 2019 the agency had purchased two vehicles and installed two charging stations, with an expected savings of 15–20% compared to traditional gasoline-powered cars.<sup>10</sup> However, the overall demand for electric vehicles in Winnipeg is low, in part due to a low level of public knowledge and few provincial incentives.<sup>11</sup> One exception is Manitoba Hydro's \$3,000 rebate for the purchase and installation of electric-vehicle charging equipment under its Home Energy Efficiency Loan.<sup>12</sup>

In 2018, Manitoba discontinued its taxicab board, which allowed the City of Winnipeg to take over the regulation of ride-hailing services.<sup>13</sup> However, due to the Province's continued control of drivers' insurance, as well as its unusual requirement for drivers to select from four different time periods (but not year-round coverage), it took Uber two years to negotiate its way to Winnipeg.<sup>14</sup> The City also recently ran a pilot program requiring taxi riders to pre-pay \$10 of every trip as a way of reducing the number of fare

disputes. The pilot ended early, due to the COVID-19 pandemic, but the City intends to continue researching the issue.<sup>15</sup>

Finally, in 2020 the Province passed the Vehicle Technology Testing Act, which created a regulatory framework for autonomous technology testing on provincial roads.<sup>16</sup> This will have a particular impact on Manitoba's trucking industry, which employs 28,000 people and contributes \$2 billion to the provincial economy,<sup>17</sup> as the idea of a driverless truck corridor between Mexico and Manitoba has been discussed since at least 2015.<sup>18</sup>

Planners mentioned that Winnipeg Transit has explored the use of hydrogen for powering motor vehicles. However, they are currently facing a catch-22 when it comes to refuelling infrastructure: there aren't enough cars to justify building hydrogen stations, yet the public is reluctant to buy vehicles if there aren't enough stations at which to refuel. It is believed that Winnipeg Transit would not create a large enough market for hydrogen on its own.

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**“The geography of Winnipeg is unlike any other city I’ve ever seen in the world. It’s so radial, where everything goes through a very small number of pinch points. And that’s true of all modes of transportation.”** – A PLANNER FROM WINNIPEG DESCRIBING THE UNIQUE LAYOUT OF THE CITY

# Winnipeg Innovations (continued)

## PUBLIC TRANSIT

All buses in Winnipeg's fleet have been equipped with GPS trackers since 2009, and LED displays at 100 different bus stops inform patrons about bus arrivals in real time.<sup>19</sup>

The 2011 Winnipeg Transportation Plan included six corridors of separated rapid bus lines, the first of which, the 11-kilometre Southwest Transitway, opened in April 2020.<sup>20</sup> Despite a decline in ridership numbers during the COVID-19 pandemic, the City chose to not decrease the frequency of buses on the new line to ensure the safety of its users.<sup>21</sup> To decrease costs moving forward, the City plans to no longer build separate bus corridors, and instead to use existing roads for dedicated transit lines.<sup>22</sup> The Winnipeg Transit Master Plan, which proposes an entirely new transit network built around rapid transit infrastructure expansion, was finalized in March 2021.<sup>23</sup>

In 2014, Winnipeg began operating four electric buses on one of its routes as a pilot project, funded by Sustainable Development Technology Canada. This resulted in decreased noise, reduced pollution and improved air quality, and savings in terms of both energy and maintenance costs.<sup>24</sup> As of 2021, the City is considering a \$38.3-million investment in the Transition Fleet Project, which will fund the purchase of 16 buses with various sources of power (battery-electric and hydrogen fuel-cell), as well as the necessary infrastructure. If successful, this will be the first project of the Transition to Zero-Emission

Bus Program, the City's most recent attempt to evaluate and plan for the full electrification of its buses.

The goal is to put Winnipeg on track to add at least 100 zero-emission buses by 2027, 210 zero-emission buses by 2030 (30% of the total fleet), and to convert all buses by 2050.<sup>25</sup>

Beginning in fall 2021, Winnipeg launched a 3-year pilot program aimed at improving on-demand transportation options for people who require accessible vehicles. The pilot will create a centralized dispatch system for requesting rides and provide incentives to drivers and vehicle owners to update their vehicles in order to make them accessible.<sup>26</sup>

## ACTIVE MODES AND MICROMOBILITY

Winnipeg began developing a framework for bikesharing in 2019, with the intention of allowing a privately operated, non-motorized shared bicycles pilot the following year.<sup>27</sup> At the same time, the Downtown Winnipeg Business Improvement Zone has provided bicycles for rent from May to October since 2014, with 22 bikes spread across 5 locations in 2018. The City provides yearly financial assistance of \$1,750 per bike for this program, with an estimated 200 people using the service in 2017.<sup>28</sup> Winnipeg also began researching the potential of shared electric scooters and bicycles in 2019,<sup>29</sup> and the passage of the provincial Vehicle Technology Testing Act created a regulatory framework for a pilot to be launched in the future.<sup>30</sup>

In May 2021, Winnipeg added 17 more streets to its Sunday and holiday bike-route program. This initiative was started during the COVID-19 pandemic, in response to a need for more recreational spaces outdoors. However, these streets are available to cyclists only, as pedestrians can't walk on roads according to Manitoba's Highway Traffic Act. The City is exploring ways that pedestrians can also access streets closed to motor vehicles, such as through bylaws.<sup>31</sup>

# \$1.8

million dedicated to improving Winnipeg's accessible on-demand transit.

(CTV NEWS)



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# Winnipeg

## Other Factors

### PROVINCIAL LEADERSHIP

As the capital of Manitoba, Winnipeg is often mentioned as a partner in provincial strategies, including Manitoba Innovation, the Minister of Energy and Mines, Energy Development Initiatives, the Electric Vehicle Road Map, and the Intelligent Transportation Systems Study prepared for Manitoba Infrastructure by IBI Group. However, at times the City has been out of sync with the province, and not had its own publicly discussed initiatives prepared on these topics when the provincial initiatives were announced.

### PARTNERSHIPS

Since 2015, Winnipeg has been a member (along with the provincial government, Manitoba Hydro, New Flyer Industries Canada ULC, and Red River College) of a joint task force looking into opportunities to deploy electric buses. In 2018, Red River College opened the MotiveLab, a \$10-million climatic test chamber that evaluates the performance of electric vehicles, including buses, on and off of highways.<sup>32</sup>

The City has partnered with the traffic-information app Waze, which allows for seamless real-time communication between the Transportation Management Centre and drivers.<sup>33</sup> Winnipeg has also reached an agreement with CN Rail that will allow Union Station to become the City's rapid-transit hub, and replace some existing downtown tracks with bus corridors.<sup>34</sup>

### PEOPLE-CENTRED SNOW CLEARING

For the winter of 2020, Winnipeg worked with several community groups to prioritize snow clearing on sidewalks and pathways, in anticipation of higher demand due to COVID-19 and the closure of many indoor activities.<sup>35</sup> The City created a policy that organized active transportation into three groups and assigned each group a different amount of enhanced maintenance.<sup>36</sup>

### REGIONAL CONNECTIVITY

In 2020, Winnipeg began studying the potential for the extension of its public transit system to 15 communities in the larger metropolitan region. This has been identified as an acute need since Greyhound Canada suspended its services to the region in 2018. The provincial government has indicated its support for the project if it can be shown to support the province's environmental goals.<sup>37</sup>

### COVID-19

The COVID-19 pandemic has led to lower transit ridership numbers, which disproportionately affect Winnipeg's transit revenues relative to other municipalities. (See "Transit Budgets and Revenue" subsection below.) Planners expect this reduced revenue to have a long-term effect on future transit budgets and projects.

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# \$46.4

## million to switch Winnipeg's waste management to electric garbage trucks.

(WINNIPEG FREE PRESS)

# Winnipeg Challenges

## ELECTRICITY SUPPLY

Under the provincial Manitoba Hydro Act, no other organization can sell electricity in the province, which is an obstacle for operators of electric-vehicle charging stations.<sup>38</sup>

## ACCESSIBILITY

There are concerns with the structure of Winnipeg's City-run Transit Plus system, which delivers door-to-door services for people with disabilities. Under the current system, users must report the purpose of their trip and the system then determines its priority level, with so-called "higher-priority" outings like medical appointments given precedence over lower ones, such as socializing or recreation. Users have called the current system discriminatory, and planners are aware of the conflict.<sup>39</sup> In 2020, Winnipeg's City Council voted to support the elimination of the trip-priority policy, and Transit Plus is working with its vendor and software-scheduling system to launch a priority-less service in the fall of 2021.

## TRANSIT BUDGETS AND REVENUE

Farebox revenue accounts for a far larger share of transit's budget in Winnipeg, per capita, than in any other Canadian city—45% of the total expenditure in 2019.<sup>40</sup> This arrangement dates back to 2017, when the provincial government decreased its contribution to the City's transit budget, resulting in a \$5.1-million gap that year.<sup>41</sup> This is further compounded by Winnipeg's ridership numbers, which are the lowest among the largest cities in Canada,<sup>42</sup> and which is partially explained by the lack of convenient access to transit for many of the city's residents.<sup>43</sup>

## INNER-CITY INEQUITY

Residents of Winnipeg's inner-city neighbourhoods are among the most disadvantaged groups in the city when it comes to transportation, due to factors including low vehicle-ownership rates, low income, and minority status. Furthermore, equity does not seem to be a consideration in the planning of new routes, including rapid-transit buses, which to date has been more concerned with attracting choice riders and distributing resources equally rather than ensuring services are provided to transit-dependent communities.<sup>44</sup>

**“The planning paradigm is not yes or no, it’s just absent.”**

**– A WINNIPEG PLANNER DESCRIBING THE CITY'S HISTORICAL LAISSEZ-FAIRE ATTITUDE TOWARD PLANNING**

# Winnipeg SWOT Analysis



## STRENGTHS

- Winnipeg's Transportation Management Centre is connected to all signalized intersections and can adjust signal timing anywhere in the city in response to traffic alerts received from sensors, cameras, and smartphone apps.
- The City completed the first of six planned BRT corridors on time and under budget, and maintained its level of service despite the drop in ridership due to the COVID-19 pandemic. This demonstrates a commitment to sustainability and equity goals expressed in Winnipeg's planning documents.



## WEAKNESSES

- Current transit ridership numbers could make further investment politically difficult and could contribute to a cycle of degradation to the quality of the transit system.
- A lack of focus on equity in existing planning documents could harm the vulnerable populations of Winnipeg and limit their opportunities for economic growth.
- Farebox revenue accounts for a far larger share of transit's budget, per capita, than in other major Canadian cities.



## OPPORTUNITIES

- The City is an economic and administrative centre of the province, which positions the Manitoba government, large businesses, and utility providers as partners in developing its transportation system. Moreover, the capacity within Winnipeg's planning department is growing, which may improve strategic-planning outcomes on transportation.
- The Vehicle Tech Testing Act introduced a regulatory framework for AV testing on provincial roads. Combined with the regional task force on bus electrification, the City's facility for electric bus testing, and its proximity to bus manufacturer New Flyer, these factors give Winnipeg an opportunity to become a leader in electric buses and autonomous trucking in North America.



## THREATS

- There is a lack of infrastructure for the large-scale adoption of electric buses, both in terms of garages and the ability to provide adequate electrical power.
- Lack of public awareness campaigns and dedicated incentives towards electric vehicles might keep demand for EVs low.

# Winnipeg Municipal Innovation Index

## ACTIONS AND POLICIES:

	Absent	Research	Plan	Pilot	Practice	
<b>SUPPORT SUSTAINABILITY</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Private vehicle electrification				█		Winnipeg Fleet Management Agency Pilot Project
Public transit electrification				█		Transition Fleet Project
Carshare					█	Carshare Parking Permit Pilot Project
Bikeshare			█			Framework in development since 2019
Shared electric micromodes		█				Manitoba Vehicle Technology Testing Act
Mode integration	█					No information on plans, pilots, or projects
Smart land use			█			Complete Communities Direction Strategy

## INNOVATE WITH TECHNOLOGY

	1	2	3	4	5	
Vehicle-to-vehicle communication	█					No information on plans, pilots, or projects
Vehicle-to-infrastructure communication					█	Transportation Management Centre Upgrade
Autonomous technology		█				Manitoba Vehicle Technology Testing Act
On-demand transit service				█		Pilot launched in 2021
Trip planning					█	Navigo Trip Planner
Smartfare					█	peggo (Smartcard)
Data sharing					█	City of Winnipeg Open Data Portal

## ADVANCE PUBLIC GOOD

	1	2	3	4	5	
Equity				█		Snow cleaning priority for active modes
Accessibility	█					No information on plans, pilots, or projects
Public-private partnerships					█	Joint Task Force in Electric Buses
Health and safety				█		For-hire vehicles dispute resolution pilot
Mobility pricing	█					No information on plans, pilots, or projects

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# GREATER TORONTO

## The Super-Region

POPULATION | CITY: 2,731,571 / REGION: 5,928,040 (2015) <sup>1</sup>

AREA | CITY: 630.2 km<sup>2</sup> / REGION: 5,905.84 km<sup>2</sup> <sup>2</sup>

POPULATION DENSITY | CITY: 4,334.4 p/km<sup>2</sup> / REGION: 1,003.8 p/km<sup>2</sup> <sup>3</sup>

MEDIAN HOUSEHOLD INCOME | CITY: \$65,829 / REGION: \$78,373 <sup>4</sup>



# Toronto Overview



Located on the northwest shore of Lake Ontario, Toronto is both Canada's most populous city, and the country's financial and economic hub.

It is also the centre of the Greater Toronto Region, which includes the nearby regions of Durham, Halton, Peel and York. Toronto is located on the ancestral traditional territories of the Ojibway, the Anishinaabe, and the Mississaugas of the New Credit, on land that is covered by the Upper Canada treaties. In the late 19th and early 20th century, Toronto, while not as large or economically significant as Montreal, was an attractive destination for many European and Chinese immigrants. During the mid-20th century, Toronto banded together with 6 surrounding municipalities to form a regional government, known as Metro Toronto, which evolved into the modern-day City of Toronto in the late 1990s. In its planning history, Toronto has at times prioritized automobiles over other modes of transportation, but since the early 2010s has been advancing one of the most extensive transit build outs in North America.

# Toronto Mobility Overview

**MOTOR VEHICLES ARE** the most popular mode of transportation in the City of Toronto, with just over 50% of residents commuting primarily via car, truck, or van. Yet public transit is a fairly close runner-up, at 37%. In the Greater Toronto region, 67.7% of residents commute via motor vehicle, and 24.7% via public transit. Transit in the Toronto region is operated by two different organizations: the Toronto Transit Commission (TTC) operates transit within the City (buses, subways, streetcars, and paratransit), while Metrolinx operates the regional transit network GO Transit.

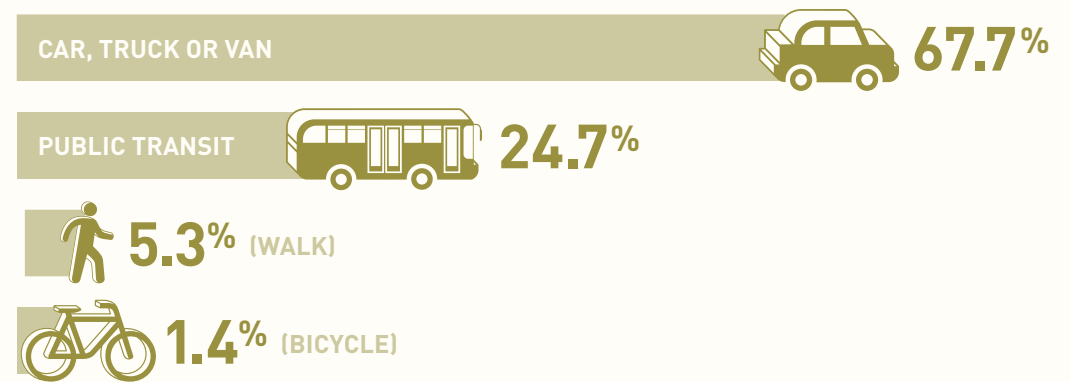
Toronto is also home to bikesharing services, with 18,780 residents having signed up for an annual membership as of 2020.<sup>5</sup> This service is subsidized by the City.

Planners in Toronto describe a City culture that is generally supportive of mobility innovation, and a private sector that is especially motivated and active when it comes to bringing new ideas to the biggest urban market in the country. Planners prioritize active modes of transportation over motor vehicles, when possible, and try to always approach their work through the lens of equity. Planners also pointed out that innovation can take many forms, and that advances on, for example, the back end of the transit system can end up having a larger overall impact than the latest flashy, high-tech gadget.

“A big part of what we’re trying to achieve in mobility is encouraging a higher mode share for transit and active transportation. We want to put people into transit first, as opposed to private vehicles.”

– A TORONTO PLANNING DISCUSSING THE SHIFTING PRIORITIES OF MODE SHARE AWAY FROM THE PRIVATE VEHICLE

## MAIN MODES OF COMMUTING IN GREATER TORONTO (2016 CENSUS)





# Toronto Innovations

## MOTOR VEHICLES

The City of Toronto uses technology to tackle traffic congestion on its streets. Its Congestion Management Plan includes a signal-coordination pilot that coordinates and retimes traffic signals on major arterial roads,<sup>6</sup> and pilots two alternative smart-traffic management technologies. The pilot has been in place since 2017, and has improved congestion at the corridors where these technologies have been deployed.<sup>7</sup> As a spinoff of the Congestion Management Plan, the City has also developed a Curbside Management Strategy, which includes a provision for licenced taxis to park next to approved hydrants, and a pilot to create special areas only accessible to delivery vehicles.<sup>8</sup>

Toronto adopted its electric vehicle strategy in 2020, with a goal of increasing the share of electric vehicles to 5% by 2025, to 20% by 2030, and to fully

phase out carbon-emitting vehicles by the middle of the century.<sup>9</sup> To prepare for this strategy, Toronto conducted a social-vulnerability analysis, and established a goal of equitable access to public charging, incentives, and shared electric mobility.<sup>10</sup> The City has had an Electric Vehicle Working Group since 2010,<sup>11</sup> which has led to positive outcomes like the Residential On-Street EV Charging Station Pilot.<sup>12</sup> As of 2018, there were approximately 6,300 private electric vehicles in the City of Toronto, as well as approximately 700 public charging stations.<sup>13</sup>

Incentives for electric vehicles include the Home Energy Loan Program, which provides funding for electric-vehicle charging,<sup>14</sup> and the Toronto Green Standard, which requires all new multifamily housing and non-residential developments in the City to equip one-fifth of all parking spaces with electric vehicle supply equipment, and to ensure the remaining spaces

are able to install this technology in the future. A similar provision for commercial buildings is stipulated in the Ontario Building Code as of 2018.<sup>15</sup>

The City of Toronto has also adopted the Automated Vehicles Tactical Plan, which plans for automated-vehicle technology to be operational on the streets by 2022. This plan also promotes and increases social equity and health, environmental and economic sustainability, mode integration, and road safety, as well as ensuring data privacy.<sup>16</sup> As part of the tactical plan, the City established a Transportation Innovation Zone on the Exhibition Place grounds as a testbed for emerging technology trials and launched a Transportation Innovation Challenge, with the first call for proposals being for automating sidewalk winter maintenance in 2020.<sup>17</sup>

**“We’re still in the middle of a paradigm shift when it comes to thinking about mobility. The purpose of a road is not just about moving cars. The purpose of a road is about how we move as many people through as efficiently and effectively as we can.”**

– A PLANNER IN TORONTO DISCUSSING THE DIFFICULTIES OF MOVING AWAY FROM CAR DEPENDENCY

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# Toronto Innovations (continued)

## PUBLIC TRANSIT

The City of Toronto's climate action strategy, TransformTO, calls for the electrification of all TTC buses by 2040, as part of a broader effort to decrease annual greenhouse-gas emissions by 80% by 2050.<sup>18</sup> As of 2020, Toronto had 60 electric buses—the largest fleet in North America—with the TTC recommending the purchase of 300 more between 2023 and 2025.<sup>20</sup>

Toronto has also invested in upgrading its communication infrastructure for public transit. The City of Toronto spent \$100 million on the Vehicle Information System and Integrated Operations Network (VISION) to have better information for scheduling, planning, and updating customers, spent \$562 million on Automatic Train Control to increase the safety and speed of subway trains on Line 1, and introduced the King Street Pilot to test transit vehicle priority and queue jumps to pave the way for developing a Surface Transit Priority Plan.<sup>21</sup> This pilot is now permanent.

The TTC converted subway operations on its Yonge-University-Spadina line from manual fixed-block signaling to automated train control to increase capacity.<sup>22</sup>

When it comes to artificial intelligence (AI), the City of Toronto, TTC, and Metrolinx partnered on a pilot to test an eight-seat automated vehicle that will con-

nect a neighbourhood not currently served by regular transit service to the Rouge Hill GO Station. This pilot was supposed to start in spring 2021 but was postponed to the autumn, due to COVID-19.<sup>23</sup> Metrolinx also uses AI to reduce fuel consumption through its Throttle Control Program. To date, the program—which received the Railway Association of Canada's environmental leadership award in 2019—has reduced the agency's overall fuel consumption by 19%, and is expected to save almost \$2 million per year.<sup>24</sup>

## ACTIVE MODES AND MICROMOBILITY

As of 2020, Bike Share Toronto has 6,850 docked bikes distributed among 625 stations in the city. Between 2016 and 2019, the system more than tripled its footprint, nearly tripled its ridership, and almost doubled its membership numbers.<sup>25</sup>

According to City of Toronto bylaws, pedal-assisted e-bike riders must follow the same rules as regular bike users. Power-assisted e-bikes, meanwhile, are not allowed on separated bicycle lanes, multi-use trails, or paths in parks, and e-scooters are not allowed to be operated or stored on public streets.<sup>26</sup>

Following the Province of Ontario's introduction of a five-year framework for the deployment of shared e-scooters, the City of Toronto decided not to participate in the pilot, citing concerns with accessibility, insurance and program management.

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**“Innovation, in my mind, isn't always just about the shiny new technology. Innovation is also about setting up for a change.”**

**– A TORONTO PLANNER NOTING THAT INNOVATION NEEDS TO BE INCLUDED IN STRATEGIES, POLICIES, AND PLANS**

# Toronto

## Other Factors

### AUTONOMOUS-VEHICLE RESEARCH

In 2021, the autonomous-technology company Gatik received nearly \$1 million from the Ontario Autonomous Vehicle Innovation Network to adapt its technology to Canada's winters. The company has a 12,000 ft<sup>2</sup> research-and-development facility in Toronto and operates a fleet of automated delivery vehicles that transport produce from an automated facility to Loblaw outlets.<sup>27</sup>

### MODE INTEGRATION

At the Kipling Transit Hub, users can choose between GO Transit, MiWay buses, and TTC routes, while their bikes are parked at one of 90 available spaces and their cars at one of 1,400 parking spots. This hub was completed in May 2021, and is expected to increase accessibility for Greater Golden Horseshoe residents and accommodate future demand for transportation services.<sup>28</sup>

### SAFETY FOR STUDENTS

The Toronto Student Transportation Group, a collaboration between the Toronto Catholic District School Board and the Toronto District School Board, is partnering with two private technology companies for a pilot program that will use video recordings, data collection, and air-purification equipment to increase the safety of student transportation. If successful, the pilot can be expanded to 1,800 vehicles serving more than 50,000 students.<sup>29</sup>

### EQUITABLE URBAN DEVELOPMENT

The City of Toronto is a signatory to the Declaration of Cities Coalition for Digital Rights, joining 25 other cities from around the world that look to use digital technologies safely and equitably.<sup>30</sup>

Toronto has been working for years with Google's Sidewalk Labs to finalize plans for a smart-city demonstration project at its waterfront. The project was intended to introduce a higher quality of life for its residents, but was criticized by the public for data-privacy issues and ultimately cancelled. The City has pledged to re-focus on affordability, sustainable design, and local businesses as drivers for the neighbourhood going forward.<sup>31</sup>

### ACCESSIBILITY

The TTC's paratransit service, Wheel-Trans, provides services to users with physical, cognitive, sensory, and mental-health disabilities.<sup>32</sup>

In accordance with the Ontario Human Rights Code and the provincial Accessibility for Ontarians with Disabilities Act, the TTC has several programs that aim to reduce barriers for people with disabilities to use transit. The Easier Access program plans to upgrade 55 stations with wide-entry gates, automatic doors, and elevators by 2022, while also purchasing accessible buses and streetcars, simplifying way-finding, adding braille to elevators, and improving subway platform edges system-wide.

Planners in Greater Toronto are aware that equity and accessibility can be an issue with private mobility

companies, whose products are not always tailored to all residents. Planners try to consider any new products or technologies through the lens of equity, and work with council to regulate them accordingly.

**“I think the success is that the most vulnerable to this new technology were placed front and centre in the public conversation about whether this innovation should be adopted or not in our city.”**

**– A TORONTO PLANNER ABOUT THE CITY'S DECISION TO NOT ALLOW E-SCOOTERS DUE TO CONCERNS AROUND ACCESSIBILITY, INSURANCE AND PROGRAM MANAGEMENT**

# Toronto Challenges

## ELECTRIC-VEHICLE BARRIERS

Like the rest of Canada, the main impediments for electric-vehicle adoption in Toronto are high upfront costs (especially when compared to fuel-powered cars), scarce availability of charging infrastructure, low public awareness of incentives and sustainability benefits, and waiting lists at dealerships that range from three to eighteen months.<sup>33</sup> In 2018, the termination of the provincial incentives program for electric and hydrogen vehicles resulted in a 55% drop in electric-vehicle purchases across the province the following year.<sup>34</sup>

## LACK OF INCENTIVES FOR SHARED VEHICLES

Toronto's regulatory environment for shared vehicles lags behind cities like Montreal and Vancouver, with no incentives to allocate space for shared cars in new buildings, and a prohibitive parking-permit pilot that contributed to one provider leaving the market in 2018.<sup>35</sup> The City's unwillingness to provide on-street parking privileges for shared vehicles is also considered a factor in that provider's decision to suspend business in Toronto.

## BUREAUCRACY

Planners in Toronto describe a bureaucratic structure that involves many stakeholders, and where each stakeholder's relative appetite for risk or change has to be carefully weighed. When a project involves multiple levels of government, competition can emerge over how the project is implemented, who will operate it, and who will pay for it. At the same time, planners acknowledge that the sheer size of the City of Toronto sometimes means that the city's needs, particularly when it comes to transit, are given priority over the rest of the region.

## AGGRESSIVE PRIVATE SECTOR

Planners report that keeping up with new developments in the private sector, especially those that involve new technologies, is an ongoing challenge. Given that private companies tend to move more quickly than government, municipalities must find a balance between responsiveness and due diligence.

## COST OF FARE-CARD SYSTEM

In 2012, Ontario's auditor general warned that with a price tag of \$700 million, Presto, the region's transit fare payment scheme, could become one of the most expensive systems of its kind in the world. The original contract, signed in 2006 by Ontario's Ministry of Transportation and Presto's operator Accenture, allocated \$150 million for capital costs;<sup>36</sup> by 2018, Presto's total budget increased to \$1.2 billion, a sum equal to the development of an 11-kilometre stretch of LRT in the region.

## CONGESTION

Toronto was the second-most congested city in Canada in 2019, with driving times on average 30% longer than a free-flowing network, more than 50% longer during morning rush hour and 68% longer during evening prime commute hours. This congestion amounts to approximately 142 hours of lost time on the road per person,<sup>37</sup> and \$6–11 billion in financial losses to the region—a number that is expected to increase to \$15 billion by 2031.<sup>38</sup>

## COVID-19

Like other municipalities, Greater Toronto saw its transit-ridership numbers dwindle during the COVID-19 pandemic. Planners noted, however, that this dropoff happened disproportionately, with travel during peak hours being far more affected than during “pre-peak” hours. This is thought to be because workers travelling during peak hours tended to be white-collar workers (many of whom were re-assigned to work remotely), while pre-peak travellers tended to be essential workers whose work situations remained largely unchanged. Planners are studying these changes in behaviour to better understand how to tailor and improve services in the future.

# Toronto SWOT Analysis



## STRENGTHS

- The City of Toronto's planning strategies, programs, and bylaws provide a number of incentives for adopting private electric vehicles.
- Toronto has the largest fleet of electric buses in North America and has many other innovative transit-infrastructure projects underway.
- Planners are up to date on innovation solutions, and use a variety of policy tools to explore their feasibility.
- Transportation planning and policy development are vetted through an equity lens.
- The City's strategic location offers the region a competitive advantage to leverage urban-mobility innovations over its peers.
- Implementing robust intra- and intercity transit capitalizes on nearby regional economic activity.



## WEAKNESSES

- While assessing shared e-scooter technology before determining whether to proceed with a pilot (in which Toronto ultimately decided to not participate), Canada's largest city lags behind its peers in providing alternative transportation modes.
- Toronto's lack of support for carsharing is an impediment to reducing the number of private vehicles on its roads and encouraging more compact development.



## OPPORTUNITIES

- The City of Toronto's use of an equity lens, along with its plans to eliminate barriers for people with physical and cognitive disabilities, can significantly improve universal accessibility when it comes to mobility.
- Toronto's Transportation Innovation Zone is a testbed for emerging technology trials and its Transportation Innovation Challenge can increase the number of innovative projects in the future.



## THREATS

- The high cost of the region's fare-payment system implementation could decrease the public's trust in the efficacy of public spending and thereby decrease support for other transit-development projects.
- Toronto is the second-most congested city in the country, and hasn't yet considered any tactics that would internalize the cost of driving for private vehicle owners and encourage their switch to other modes.

# Toronto Municipal Innovation Index

## ACTIONS AND POLICIES:

	Absent	Research	Plan	Pilot	Practice	
<b>SUPPORT SUSTAINABILITY</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Private vehicle electrification						On-street EV Charging Station Pilot
Public transit electrification						TTC Green Bus Program
Carshare						No city incentives for carsharing
Bikeshare						Bikeshare Toronto
Shared electric micromodes						City of Toronto declined to participate in e-scooter pilot
Mode integration						Mode integration at regional hubs
Smart land use						Toronto Green Standard

	1	2	3	4	5	
<b>INNOVATE WITH TECHNOLOGY</b>						
Vehicle-to-vehicle communication						No information on plans, pilots, or projects
Vehicle-to-infrastructure communication						Automatic Train Control
Autonomous technology						AV shuttle pilot in Fall 2021
On-demand transit service						Durham Region on-demand service
Trip planning						TTC Trip Planner
Smartfare						Presto (Smartcard)
Data sharing						Toronto's Open Data Portal

	1	2	3	4	5	
<b>ADVANCE PUBLIC GOOD</b>						
Equity						Electric Vehicle Strategy
Accessibility						Easier Access Program
Public-private partnerships						AV Company Gatik
Health and safety						Automated Vehicles Tactical Plan
Mobility pricing						No information on plans, pilots, or projects

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# OTTAWA-GATINEAU

**POPULATION** | OTTAWA: 934,243 / GATINEAU: 276,245 / REGION: 1,323,783 (2015) <sup>1</sup>

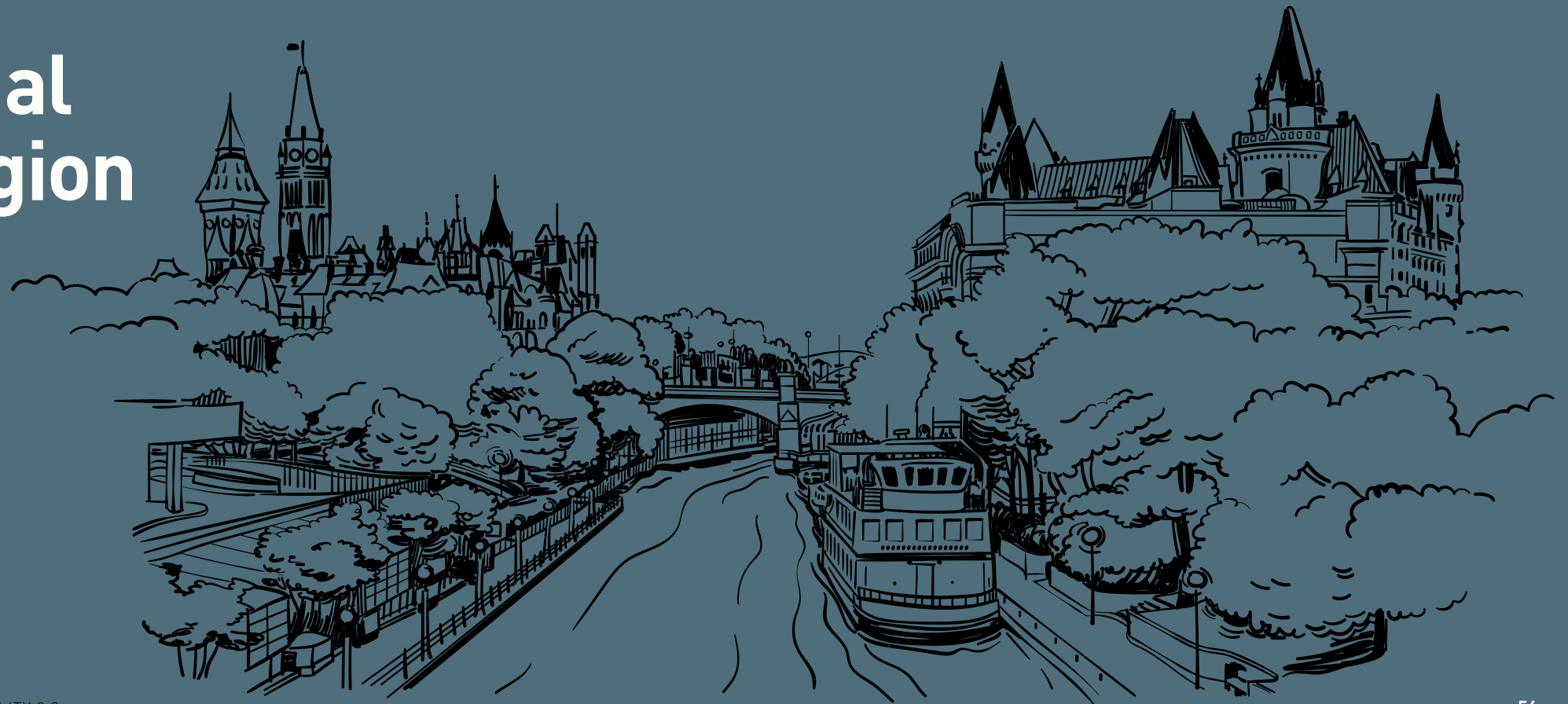
**AREA** | OTTAWA: 2,790.3 km<sup>2</sup> / GATINEAU: 342.80 km<sup>2</sup> / REGION: 6,767.41 km<sup>2</sup> <sup>2</sup>

**POP. DENSITY** | OTTAWA: 334.8 p/km<sup>2</sup> / GATINEAU: 805.8 p/km<sup>2</sup> / REGION: 195.6 p/km<sup>2</sup> <sup>3</sup>

**MEDIAN HOUSEHOLD INCOME** | OTTAWA: \$85,981 / GATINEAU: \$68,703 / REGION: \$82,053 <sup>4</sup>

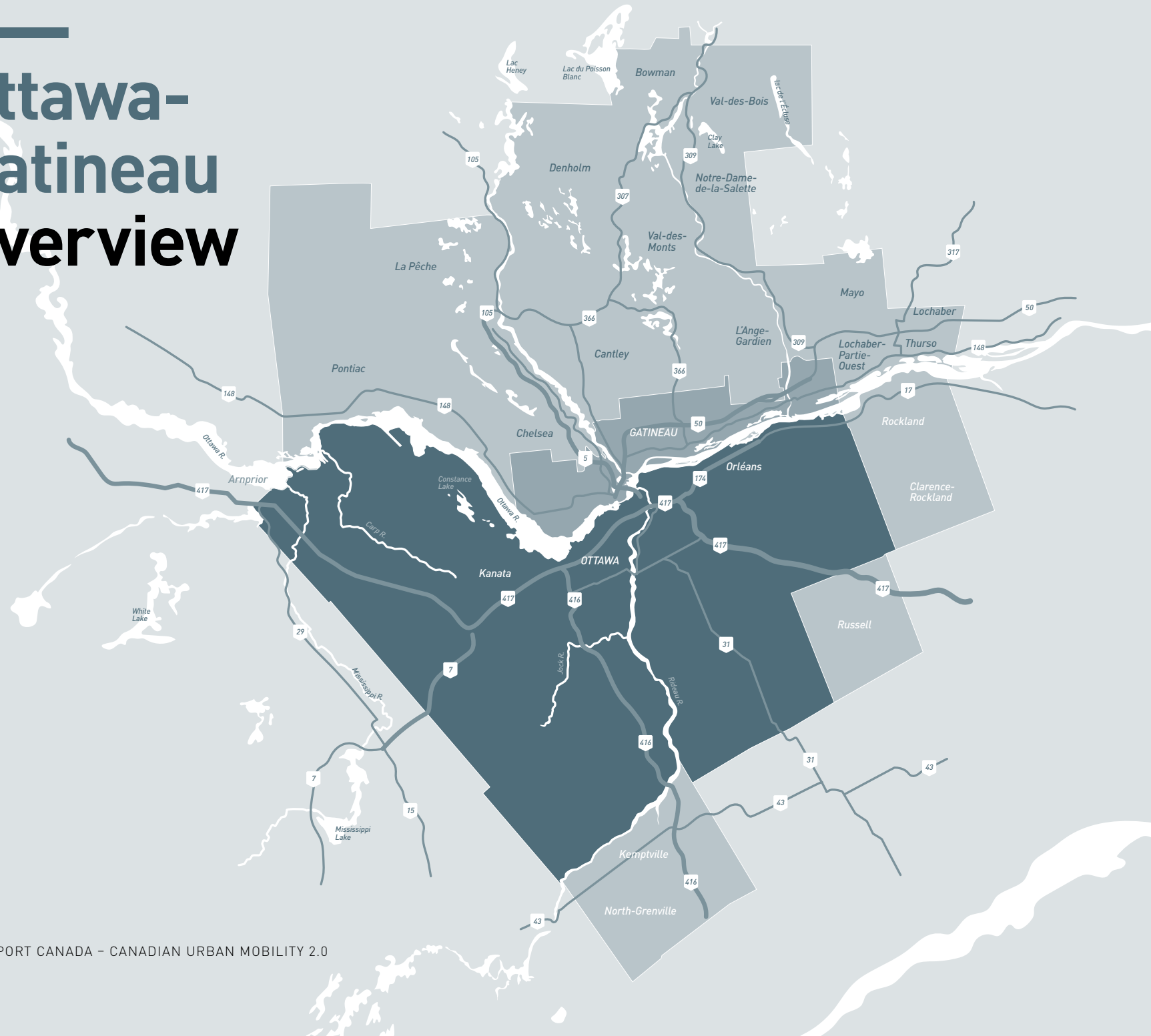
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## The National Capital Region





# Ottawa-Gatineau Overview



**Ottawa-Gatineau, also referred to as the National Capital Region, is an area straddling the border of Ontario and Quebec.**

It includes the City of Ottawa (Ontario), the City of Gatineau (Quebec), and other nearby urban and rural communities. The two cities are located on the traditional unceded territory of the Algonquin Anishinabeg People, and are divided by the Ottawa River, which also serves as a provincial boundary. Ottawa-Gatineau is a unique region in Canada, with not just different municipal and provincial quirks to manage, but also linguistic ones, given that French is the primary language in Gatineau. As the capital city of Canada, Ottawa is the centre of the country's administrative and governmental operations. Finally, public places of national significance within both Ottawa and Gatineau are under the principal stewardship of the National Capital Commission, a federal Crown corporation.

# Ottawa-Gatineau Mobility Overview

**MOTOR VEHICLES ARE THE MOST COMMON** mode of transportation in the City of Ottawa, with 68.4% of residents commuting primarily via car, truck, or van; in the larger Ottawa-Gatineau region, that number climbs to 71.5%. Another 20.6% of Ottawa residents commute via public transit, compared to 18.9% for residents of Ottawa-Gatineau as a whole. The City of Ottawa's public transit includes regular and rapid-transit buses, light rapid transit by rail, and door-to-door paratransit. It is operated by OC Transpo, which is owned by the City of Ottawa; a monthly transit pass costs \$122.50. Public transit for Gatineau, meanwhile, is operated by Société de transport de l'Outaouais (STO), and includes both standard and rapid bus services. A transit pass in Gatineau costs \$100 per month.

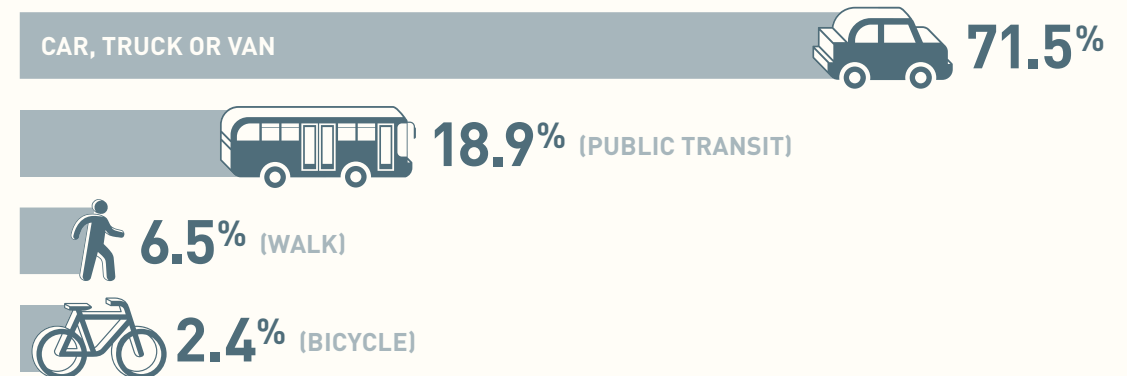
Ottawa also has private carsharing services, with approximately 0.5% of the population currently signed up for the service.<sup>5</sup>

Planners in Ottawa-Gatineau describe the region as being generally progressive when it comes to mobility innovations. They pointed out specific projects, such as Ottawa's e-scooter pilot and the region's history of bike-sharing, where the region has been ahead of many other municipalities. In other areas, however, planners believe that Ottawa-Gatineau still has room to improve.

**“We probably have more of an entrepreneurial and innovative spirit than most other cities. Almost everything we’ve done [in Ottawa] is built or designed in-house.”**

– CITY OF OTTAWA PLANNER DESCRIBING THEIR IN-HOUSE APPROACH TO TECHNOLOGY

## MAIN MODES OF COMMUTING IN OTTAWA-GATINEAU (2016 CENSUS)



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# Ottawa- Gatineau Innovations

## MOTOR VEHICLES

The Ottawa–Gatineau region has taken several steps towards electrification. To help facilitate the proliferation of zero-emission vehicles, the City of Ottawa plans to add 24 additional public charging stations for electric vehicles to its existing network.<sup>6</sup> Ottawa also recently added fully electric vehicles to its municipal fleet for the first time,<sup>7</sup> while Hydro Ottawa (the municipally owned electric utility) partnered with a Quebec company to test the impact of electric-vehicle charging on the City’s power grid.<sup>8</sup> The City of Gatineau, meanwhile, is installing 17 new electric chargers next to municipal buildings as part of its plan to fully convert its fleet to electric vehicles.<sup>9</sup>

The region also has a long history of shared mobility. Its first carsharing service, VRTUCAR, was available in 2000 (the company later merged with Quebec-based Communauto), and in 2015 was joined by Zipcar. Ride-hailing in Ottawa–Gatineau has been available since 2014, when Uber first entered the market, and Lyft joining it in 2018. Between 2015 and 2016, roughly 18% of Ottawa–Gatineau residents used ride-hailing services, which is a higher percentage than in Toronto, Edmonton, Calgary, or Montreal.<sup>10</sup>

Ottawa is home to one of the most advanced testing sites for autonomous technology in the world. Area X.O is a 1,700-acre facility, covered by a 5G network and equipped with various roadway infrastructure, including traffic signals and railway crossings that

allow for fully autonomous vehicles to be tested under various scenarios. The site was initiated by the economic-development non-profit Invest Ottawa, and is a collaboration between small businesses and industry leaders, including Nokia Canada, BlackBerry QNX, and Ericsson. Area X.O. has hosted the test operation of autonomous shuttles under the Ontario Automated Vehicle Testing Program, which assessed the operation of these vehicles in the real world and informed the development of Transport Canada’s guidelines for autonomous-vehicle testing.<sup>11</sup> In 2020, the federal government announced a \$7-million investment in Area X.O to allow for more collaborations and start-ups to emerge.<sup>12,13</sup>

Finally, Ottawa has taken steps to support connected and autonomous vehicles. The City has 1,200 adaptive control signals that allow for signal-timing plans that respond to the time of day and volume of traffic on the roads. Its traffic-control system has been updated to new controllers and software that prioritize the safety of pedestrians and cyclists, and includes new transit-priority measures based on GPS for OC Transit. As part of the pilot, drivers use a phone app that informs them of the optimum speed to get through an intersection—which trials showed led to a 5% reduction in overall fuel consumption. The next phases of this project include improvements to the phone app, expanding user groups, and possibly migrating from the third-party 4G network to other modern networks.<sup>14</sup>

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# 1,200

## adaptive control signals in Ottawa.

THESE SIGNALS ADJUST INTERSECTION TIMING TO THE TIME OF DAY, VOLUME OF TRAFFIC ON ROADS, AND IN RESPONSE TO INCIDENTS (CITY OF OTTAWA).

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# Ottawa-Gatineau Innovations (continued)

## PUBLIC TRANSIT

The City of Ottawa has expanded and improved its LRT in recent years in an effort to reduce its overall greenhouse-gas emissions, 44% of which are attributed to transportation.<sup>15</sup> In 2019, Ottawa became the first city in North America to convert a dedicated bus transitway to an LRT system, replacing a 12.5-km bus rapid-transit bus corridor with 34 electric trains; the City plans to add another 44 kilometres of LRT by 2025.<sup>16</sup> Ottawa has also announced plans to become the first city in Canada with a fully electric bus fleet by 2036.<sup>17</sup>

The City of Gatineau, meanwhile, received \$16 million from the Quebec government to study options for a new rapid-transit expansion (either LRT or a hybrid LRT/bus option), and 5% of these funds were specifically dedicated to exploring the possibility of connecting to Ottawa's LRT network.<sup>18</sup> Beginning in 2013, STO has conducted electric-bus trials in Ottawa and Gatineau, and confirmed their ability to complete a typical eight-hour shift on a single overnight charge.<sup>19</sup>

Ottawa-Gatineau has also introduced new measures to improve the user experience on public transit. STO named customer experience as its top priority in its latest strategic plan,<sup>20</sup> and in 2019 renewed its partnership with the Transcollines bus service, which allows select STO and OC Transpo passes to be recognized in both transit systems. STO also approved the purchase and installation of 500 validators to

be installed on all bus doors, to speed up boarding times and reduce crowding.<sup>21</sup> OC Transpo was the first Canadian transit agency to join the American Public Transportation Association's Health and Safety Commitments Program,<sup>22</sup> and has also been conducting studies regarding the potential of on-demand services as early as 2003.<sup>23</sup> When the Ontario government provided additional funding for transit in 2021, it was required to evaluate the potential for on-demand micro-transit as a potential cost-saving measure for some OC Transpo services.<sup>24</sup>

Planners in Ottawa-Gatineau also mentioned an intention to study the possibility of on-demand transit in the region, in part as a response to diminished ridership numbers in the wake of the COVID-19 pandemic.

## ACTIVE MODES AND MICROMOBILITY

The City of Ottawa introduced an e-scooter pilot in 2020, during which nearly 250,000 rides were taken on 600 scooters. The scooters were banned from operating on sidewalks, National Capital Commission pathways, and the streets of Gatineau, and were pre-programmed to reduce their speed to inching when entering one of these areas.<sup>25</sup> The main issue raised by citizens and disability advocates was the disorganized street parking of the scooters.<sup>26</sup> Overall, the pilot was deemed a success, and e-scooters returned to Ottawa in 2021, with an expansion to 1,200 total vehicles.<sup>27</sup> <sup>28</sup> Planners also mentioned that a recent change to Ottawa's transit bylaw now allows e-scooters to be brought onto the city's O-Trains.

Docked bike-sharing in Ottawa-Gatineau was available beginning in 2011, operated by Capital Bixi Bikeshare until 2014, and then by VeloGO until 2018.<sup>29</sup> VeloGO left the market in 2019, and no other private company has stepped in to replace it.<sup>30</sup> In 2021, Ottawa's Transportation Committee said the most sustainable model would be for the City to own the bike-sharing system and hire a contractor to manage it; it estimated a \$4-million startup cost to acquire 700 bicycles and the associated infrastructure, and another \$3 million to operate the network annually. Given these costs, and budget shortfalls due to COVID-19, currently there is no plan to implement this shared-bike system in the region.<sup>31</sup>

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# 25 km

## of proposed rapid transit expansion.

THIS EXPANSION WOULD CONNECT GATINEAU TO OTTAWA'S LRT NETWORK (CBC NEWS).

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# Ottawa- Gatineau Other Factors

## PUBLIC ENGAGEMENT

Ottawa is currently in the process of updating its transportation plan, which dates back to 2013. During its engagement with the public, it became apparent that although Ottawans don't see technology as the main reason to update the plan, they do expect automated, shared, electric, and connected transportation services to be readily available in the City in the future.<sup>32</sup>

## ENERGY EVOLUTION

One of the priorities established in the City of Ottawa's Climate Change Master Plan is reducing greenhouse-gas emissions. From 2020 to 2025, the Electric Vehicle Working Group (created by the plan) will focus on priority transportation projects like creating a strategy for increased adoption of public and private electric vehicles, replacing City fleet and public transit with zero-emission vehicles, and increasing the use of active modes and public transit.<sup>33 34</sup>

## MODE INTEGRATION

As a result of the existing partnership and joint long-term plan between STO and Communauto, the number of carshare vehicles next to STO stations increased by 40% in 2020. Moreover, users can register online and use their STO-multi-card to get access to Communauto cars.<sup>35</sup> As it relates to active transportation, many OC Transpo stations are well connected to the cycling network, with access to bike parking and accommodations like wider fare gates, runnels, and elevators, which improve the experience of using transit with a bicycle.

## EQUITY

The Social Planning Council of Ottawa has developed the Neighbourhood Equity Index (NEI), a tool that quantifies differences in economic opportunity, social and human development, physical environment, health, and community belonging between the City's neighbourhoods. The NEI was developed using the World Health Organization's Urban HEART (Health Equity Assessment and Response Tool) framework, and its physical-environment domain includes metrics on walkability, access to public transit, and the percentage of people spending more than 45 minutes on their commute.<sup>36</sup>

---

# 40%

of GHG emissions in  
Ottawa come from  
transportation.

MORE THAN A HALF OF THAT SHARE IS PRODUCED BY PRIVATE PASSENGER VEHICLES (OTTAWA INSIGHTS).

# Ottawa-Gatineau Challenges

## TRANSPORTATION EQUITY

Population growth in the suburbs outside of Ottawa's Greenbelt has created levels of density that could potentially support new modes of transit to the area; however, current street and development typology make such provisions less viable. At the same time, workplaces for federal government workers, who account for one-fifth of jobs in the region, are being developed at a significant distance from current transit lines, making it challenging for public servants to find alternatives to driving.<sup>37</sup> More than one-quarter of Ottawa's population resides in neighbourhoods with existing or potential equity concerns, and fewer than average transportation choices. Yet there are currently few incentives for private transportation companies to expand their services in these areas.<sup>38</sup>

## FUNDING AND RIDERSHIP

Before the opening of its second LRT service, the Confederation Line, in 2019, ridership numbers on OC Transpo had been steadily declining since 2011.<sup>39</sup> Because the new LRT service opened shortly before the pandemic restrictions took effect, accurate ridership numbers are not yet available. At the same time, the agency saw a budget deficit of \$6.8 million in 2019. This can be partly explained by the delay in the opening of the LRT line, which led to having to pay existing bus drivers overtime instead of hiring more operators as planned.<sup>40</sup> Ottawa budgeted \$647 million for transit in 2021, which accounts for 16.4% of total City expenditures; however, its ridership numbers are still nowhere near pre-pandemic levels.

## COVID-19

Planners in Ottawa-Gatineau said that the COVID-19 pandemic has proved challenging in several ways. Ridership numbers for public transit fell drastically in 2020 and into 2021, which has affected overall transit budgets. The coronavirus has also led to delays in acquiring new supplies and equipment, especially from the United States. At the same time, planners believe that COVID-19 has stimulated some innovative new thinking as it relates to mobility, and has advanced ideas like on-demand transit faster than they would otherwise have progressed.

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**“Nobody has the crystal ball for when ridership will be what it was pre-pandemic. It might be five years from now. It might be ten years.”**

– OTTAWA PLANNER DISCUSSING THE POTENTIAL LONG TERM IMPACTS OF COVID-19 ON PUBLIC TRANSIT RIDERSHIP

# Ottawa-Gatineau SWOT Analysis



## STRENGTHS

- Strong commitment to decreasing greenhouse-gas emissions, including projects and pilots aimed at electrifying public transit and private vehicles.
- An advanced testing ground, formed as a private-public collaboration, for researching and developing autonomous-vehicle technology.
- Kanata North is quickly becoming Ottawa's leading hub for cutting-edge tech businesses and knowledge-based industries, including those related to transportation solutions.



## WEAKNESSES

- Lack of clear incentives for proliferation and wider adoption of carsharing and electric vehicles.
- Technical complexity and high cost of fully integrating the public-transit systems of each city. Municipal and provincial jurisdictions also hinder their full integration due to differing political and bureaucratic priorities.



## OPPORTUNITIES

- Cooperation between STO and Communauto, allowing for shared cars to be accessed with STO cards, can pave the way for additional mode integration in the future.
- A long history of carsharing services and a high rate of ride-hailing create a supportive environment for shared mobility options.



## THREATS

- Lack of diverse mobility options in both high- and low-income neighbourhoods; electric scooters allowed in Ottawa cannot be operated in Gatineau or on National Capital Commission lands, limiting accessibility and connectivity within the region.
- Expansive urban-development policy contributes to the sprawling nature of the region and may make alternative transportation modes infeasible.

# Ottawa-Gatineau Municipal Innovation Index

## ACTIONS AND POLICIES:

	Absent	Research	Plan	Pilot	Practice	
<b>SUPPORT SUSTAINABILITY</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Private vehicle electrification						Public electric charging stations
Public transit electrification						4 electric buses in Fall 2021
Carshare						No city incentives for carsharing
Bikeshare						No bikesharing since 2019
Shared electric micromodes						Pilot to proceed in 2021
Mode integration						STO + Communauto planning and passes
Smart land use						Ottawa Next Beyond 2036 Plan
<b>INNOVATE WITH TECHNOLOGY</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Vehicle-to-vehicle communication						Area X.O.
Vehicle-to-infrastructure communication						Area X.O.
Autonomous technology						AV shuttle pilot in Fall 2020
On-demand transit service						2021 research requested by the province
Trip planning						OC Transpo Travel Planner, Plani-Bus STO
Smartfare						Presto (Smartcard) - OC Transpo, Multi Card - STO
Data sharing						Open Ottawa / No transport data at Open Gatineau
<b>ADVANCE PUBLIC GOOD</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Equity						Neighbourhood Equity Index
Accessibility						STO all-door boarding
Public-private partnerships						Area X.O.
Health and safety						Health and Safety Commitments Program
Mobility pricing						No information on plans, pilots, or projects



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# GREATER MONTREAL

## La Métropole

**POPULATION** | CITY: 1,704,694 / REGION: 4,098,927 (2015) <sup>1</sup>

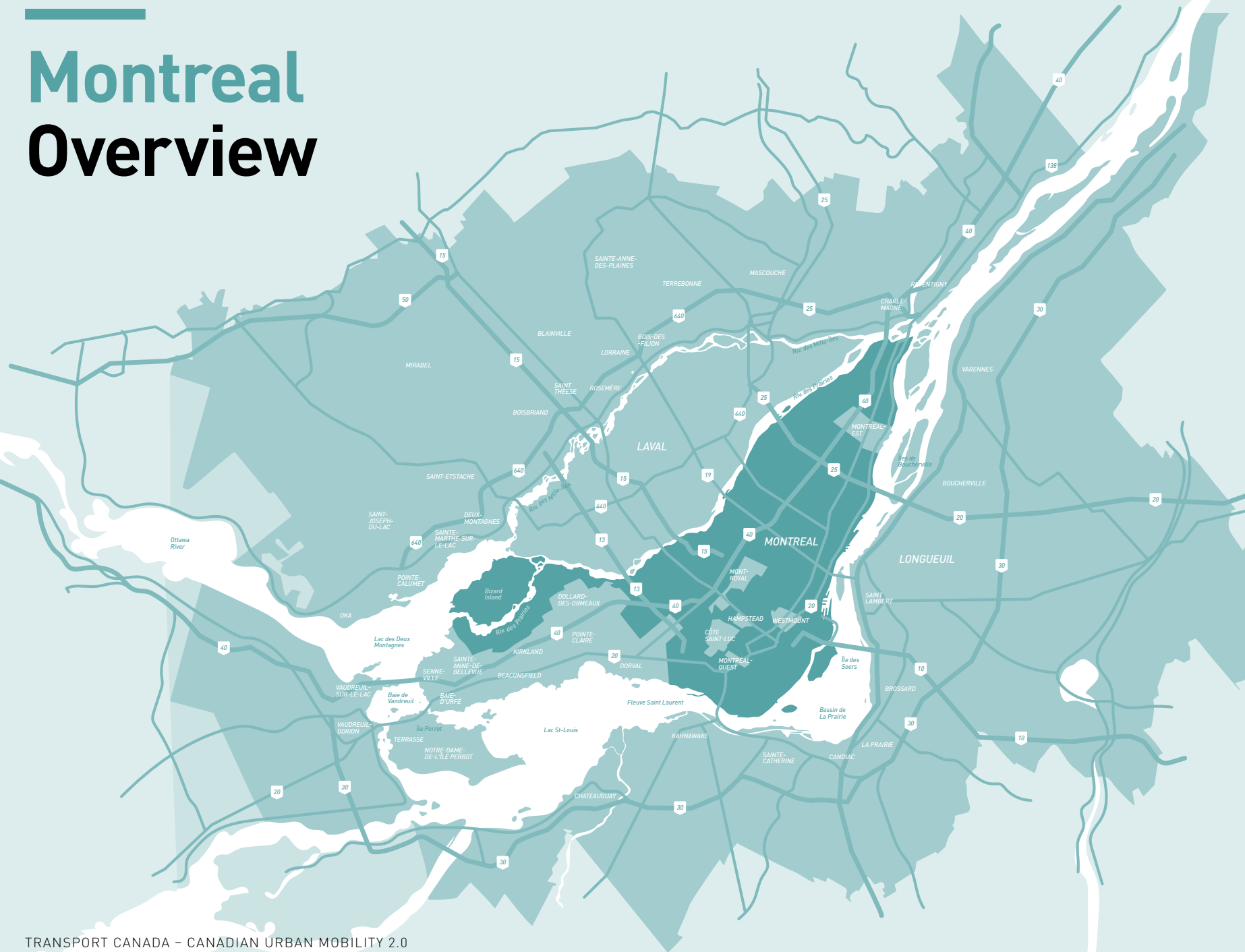
**AREA** | CITY: 365.65 km<sup>2</sup> / REGION: 4,604.26 km<sup>2</sup> <sup>2</sup>

**POPULATION DENSITY** | CITY: 4,662.1 p/km<sup>2</sup> / REGION: 890.2 p/km<sup>2</sup> <sup>3</sup>

**MEDIAN HOUSEHOLD INCOME** | CITY: \$50,227 / REGION: \$61,790 <sup>4</sup>



# Montreal Overview



**Montreal is the most populated city in Quebec, and the second-most populated city in Canada.**

It is also part of the Greater Montreal region, which includes two similar but distinct areas: the Census Metropolitan Area (CMA) and the slightly smaller Montreal Metropolitan Community (MMC), the latter of which is governed by its own president, who represents the interests of the region. The CMA includes 91 different municipalities, as compared to the MMC's 82; however, 79 of these municipalities are members of both groups. Montreal is located on the unceded Indigenous lands of the traditional territory of both the Kanien'kehá:ka, or "Mohawk," and the Anishinabeg, or "Algonquin," peoples. Geographically, most of the City of Montreal is built on an island, and is centred around Mount Royal, the mountain in the heart of downtown that gives both the city and the island their names. As with the province of Quebec as a whole, Greater Montreal is distinct from much of the rest of Canada due to its French language, culture, and politics.

# Montreal Mobility Overview

**MOTOR VEHICLES ARE THE MOST** popular mode of transportation in the City of Montreal, with 50.1% of residents commuting primarily via car, truck, or van. Public transit is also very popular in the City, with another 36.5% of residents commuting this way. For the Greater Montreal region, however, those numbers tilt significantly further in favour of motor vehicles, up to 69.1% and down to 22.8%, respectively. The principal transport authority in the region is the Autorité régionale de transport métropolitain (ARTM), which was created in 2017 by the Province of Quebec and which has a planning mandate for 83 municipalities in Greater Montreal, as well as the Kahnawake Indian Reserve and the City of Saint-Jérôme. Meanwhile, Réseau de transport métropolitain, also known as Exo, operates regional commuter rail and local bus services in the suburbs of Montreal. A monthly public-transit pass costs \$90.50.

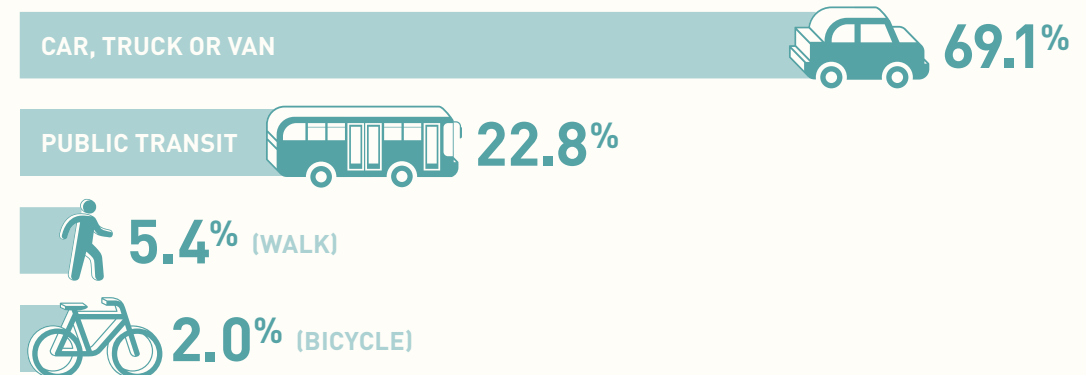
Montreal is also home to bikesharing, with 318,695 unique riders using the service in 2019.<sup>5</sup>

Planning experts in Greater Montreal describe a region with a history of mobility innovation, particularly in the realm of public transit, and an atmosphere of openness and collaboration between multiple stakeholders in the present day.

“We have a strong transit backbone, which really helps, because mobility innovation is a lot about using public transportation as a core and then trying to build on top of it.”

– A MONTREAL PLANNER DISCUSSING THE REGION’S MOBILITY STRENGTH

## MAIN MODES OF COMMUTING IN GREATER MONTREAL (2016 CENSUS)



# Montreal Innovations

## MOTOR VEHICLES

The City of Montreal started its public-charging program in 2014 with a successful pilot of two charging stations.<sup>6</sup> This led to the installation of another 106 stations by 2016,<sup>7</sup> and more than 1,200 stations as of 2021, 900 of which were installed by the City.<sup>8</sup> Quebec accounts for nearly one-half of all electric cars sold in Canada, with 92,000 vehicles on the road as of 2020. This uptake has been partly driven by the provincial Roulez Vert program, which provides a series of rebates for purchasing electric vehicles and installing charging stations; when combined with federal subsidies, residents can qualify for \$13,000 in savings on the purchase of a new or used electric vehicle.<sup>9</sup> Montreal is also actively converting its municipal fleet, and is on track to achieve its goal of replacing 250 cars operated by the city with electric vehicles, roughly a third of total municipal subcompact vehicles.<sup>10</sup>

Public electric charging is just one action item included in Montreal's Climate Plan 2020–2030. The plan also calls for developing a zero-emission zone in the city's core by 2030, effectively banning emitting vehicles from entering.<sup>11</sup> Montreal's electrification strategy and parking policy include a provision for dedicated on- and off-street parking spaces that com-

bine parking and charging fees;<sup>12</sup> however, this hasn't yet been implemented.<sup>13</sup> The City of Montreal also has an innovative approach to parking enforcement, with the para-municipal organization Agence de mobilité durable not only handling parking enforcement but also actively supporting urban mobility in forms beyond automobiles. Finally, the region provides free access for electric vehicles to toll bridges and reserved lanes on highways.<sup>14</sup>

Montreal also has a long and significant history of carsharing services, leading to the City placing third on the North American Shared Mobility City Index in 2016.<sup>15</sup> Its largest vendor, Communauto, added another 475 vehicles to its fleet in 2020, representing 67% of the company's growth in Canada and bringing Montreal's total fleet to 2,000 cars.<sup>16</sup> (At the same time, two other companies, ShareNow and Car2Go, left the market.<sup>17</sup>) Carsharing receives preferential treatment in Montreal, with its parking spaces maintained even as traditional parking stalls were removed to accommodate the high demand for pedestrian space downtown.<sup>18 19</sup>

Finally, many of Montreal's universities and private companies are actively involved in the research and development of autonomous-vehicle technology.<sup>20</sup>

“When we go small and fast, that makes innovation work.”

– A MONTREAL PLANNING PROFESSIONAL  
WHEN ASKED WHAT TACTICS HAVE BEEN  
SUCCESSFUL IN IMPLEMENTING NEW  
MOBILITY INNOVATIONS

# Montreal Innovations (continued)

## PUBLIC TRANSIT

In 2017, the City of Montreal created the Electrification and Intelligent Transport Institute, which brings together expertise from the École de technologie supérieure, McGill University, Concordia University, and Université du Québec à Montréal. The institute facilitates collaborations between sustainable-transportation companies in the region, assists the deployment of electric and intelligent transportation technologies in the City's testing corridors, and fosters international partnerships.<sup>21</sup> The institute is hosted at Montreal's Innovation Quarter and received a \$3.3 million contribution from the City.<sup>22</sup>

The Société de transport de Montréal (STM) has been investing in hybrid buses since 2016, and by 2019 had hybridized approximately one third of its fleet of 550, with a plan to convert another 300 buses by 2021.<sup>23</sup> STM has also tested various models of electric buses, with seven fully electric buses in operation by 2020; two of these were part of an order of 30 long-range electric buses produced by New Flyer, the remainder of which are set to be delivered in 2021.<sup>24 25</sup> STM plans to start buying only electric buses by 2025 and to replace all of its diesel buses by 2029.<sup>26</sup>

For other communities in Greater Montreal, the Saint-Jérôme-based La Compagnie Électrique Lion has secured a contract for 260 electric school buses with First Student, the largest operator of school buses in North America. These buses will be delivered to communities around Quebec beginning in 2021.<sup>27</sup>

Another major sustainable-transportation project in the region is the Réseau express métropolitain (REM), a 67-km, \$6.3-billion fully automated LRT. This project was largely funded by a provincial pension fund, Caisse de depot, and the Canadian Infrastructure Bank; once complete, it will be one of the largest automated systems in the world, and the second-largest in Canada. The first stage of the REM is set to be opened in 2022, offering service as frequently as every 2.5 minutes downtown.<sup>28</sup> The project was developed as a public-private partnership, with Quebec's public pension fund investing in and overlooking the process.<sup>29 30</sup>

In 2017, Montreal conducted its first pilot of a 12-passenger automated bus around Olympic Park,<sup>31</sup> with a follow-up test on public streets in 2019.<sup>32</sup> On-demand pilots have not yet been conducted in Greater Montreal; however, Société de transport de Laval (STL) recently contracted Blaise, a Montreal-based on-demand start-up, for a feasibility study of the service in Laval. Their modelling showed that replacing regular routes with on-demand service in three corridors would result in a 34% increase in farebox revenue and an 11% decrease in average travel time, with 99% of trips still being served.<sup>33</sup>

In summer 2021, 10 electric buses produced by New Flyer will enter the fleet of the Société de transport de Laval (STL). The agency hopes to have a fully electric fleet by 2040; however, only 3% of the agency's buses are currently electrified.<sup>34</sup>

Finally, the Quebec government is considering creating dedicated lanes for public transit on highways in Montreal as another way to combat congestion in the city.<sup>35</sup>

## ACTIVE MODES AND MICROMOBILITY

Bikesharing has been available in Montreal since 2008. In 2014, the City bought out the assets of Société de vélos en libre-service (the Public Bike System Company) and created a non-profit to manage its bike-sharing system under the brand Bixi Montreal.<sup>36</sup> Since then, the system has experienced consistent growth, with the number of unique users increasing by 146% and trips increasing by 81% from 2014 to 2019.<sup>37</sup> For its 2021 season, Bixi Montreal is adding 725 electric bicycles and 83 stations, for a total of 1,905 electric bikes and 153 stations, on top of its 7,270 regular bicycles. The expansion of its electric fleet is fueled by market demand, as Bixi's e-bikes were ridden 60% more than regular ones in 2020.<sup>38</sup>

The City of Montreal also piloted shared electric scooters in 2019, but decided not to renew it in 2020 due to high rates of violations related to parking, helmets, and the provincial Highway Safety Code.<sup>39</sup>

Montreal does, however, support the Colibri pilot, which is an urban package-delivery service that uses electric cargo bikes.<sup>40</sup> In 2019, 6,500 deliveries were made in the first 2.5 months of the pilot, with an average of 165 parcels per day.<sup>41</sup> The Province of Quebec subsidizes 25% of the cost of all new electric cargo bikes, to a maximum of \$2,000.<sup>42</sup>

# Montreal

## Other Factors

### MODE INTEGRATION

In 2019 the City of Montreal received a \$50-million award from Infrastructure Canada's Smart Cities Challenge. The award will be used to develop a digital platform that connects all transportation services in the City and introduces more local mobility solutions. Overall, the goal for these projects is to reorganize Montreal's transportation system around the needs of its users, allow for smooth multimodal travel, and reduce car dependency.<sup>43</sup> Separate arrangements have been made to connect REM LRT stations to bike- and car-share providers in the region.<sup>44</sup>

### HIGH TECHNOLOGICAL POTENTIAL

Montreal is home to four respected universities, several affiliated schools, numerous research-and-development facilities, and a significant presence in the digital sector. These organizations, paired with the City's targeted efforts to develop that competitive advantage, led to Montreal being named one of the top intelligent cities in the world by the Intelligent Community Forum.<sup>45</sup>

### REGIONAL GOVERNANCE OF PUBLIC TRANSIT

In 2017, the Montreal metropolitan region created a new regional body called the Autorité régionale de transport métropolitain (ARTM) with the goal of creating a better system and fare integration for its patrons.<sup>46</sup> The ARTM manages the planning and financing of public transit across the region, and receives transit funding from the province that it then distributes among the various smaller agencies beneath it. This is considered a more sustainable model that eliminates agencies' dependency on the political climate of the cities they serve.<sup>47</sup>

ARTM's plan to simplify and integrate the roughly 700 different fares currently on offer between the region's 91 transit districts was approved in 2020. The plan re-divides the region into four transit zones, with no price difference between transit modes. It is set to begin implementation in July 2021 and will take roughly three years to be fully deployed.<sup>48</sup>

### PROVINCIAL SUBSIDY FOR ELECTRIC VEHICLES

Quebec has provided subsidies for electric vehicles through the Roulez vert program since 2012, and has spent more than \$576 million on it as of 2020.<sup>49</sup> In 2020 the rebate for a new electric vehicle is up to \$8,000, and for a used electric vehicle is up to \$4,000.<sup>50</sup> The province also gave Hydro-Québec \$5 million to install 100 fast-charging stations, with an intent to add another 1,600 in the province by 2030.<sup>51</sup>

### TRANSIT EQUITY MODELLING

Researchers at McGill University have developed a range of innovative measures of accessibility. These include the Transit Generalized Cost Equity Model, which includes both the fares and the cost of time, unlike the traditional approach that accounts for the cost of time only. This more accurate model showed lower accessibility to jobs in Montreal when compared to models that use only costs associated with travel time. Researchers also found that households from predominantly low-income neighbourhoods have better transit access to employment opportunities. Overall, using both travel time and cost of fares is believed to be a superior measure of accessibility.<sup>52</sup>

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**“We are really willing to start from the ground, and we do it in a very collaborative way.”**

– A MONTREAL PLANNER DISCUSSING THEIR RESEARCH-BASED APPROACH TO MOBILITY INNOVATION

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# Montreal Challenges

## BUREAUCRACY

As a region, Greater Montreal has an unusually complex transit system, with multiple authorities and other partners involved who sometimes have competing interests and priorities. Planning experts noted that while the various parties are always willing to work together, it can sometimes be difficult to find consensus on a given project, or to find enough momentum to see a project through to completion.

## CONGESTION

Road congestion in the City of Montreal has increased by 100% over the last decade, which is equivalent to a financial loss of \$4.2 billion in 2018 alone.<sup>53</sup>

## SUBURBAN SPRAWL AND VKT GROWTH

From 2006 to 2016, the suburban population accounted for 84% of the growth in Greater Montreal. This trend, along with the associated increases in driving time for commuters, makes the task of meeting regional emission-reduction targets a challenge.<sup>54</sup>

## OBSTACLES TO CARSHARING

There are several obstacles to carsharing in Montreal, including expensive on-street parking permits (and the absence of them altogether for some parts of the city) and dated and inflexible zoning provisions. Currently only one borough in Montreal has reduced parking requirements for buildings that provide car-sharing.<sup>55</sup> The City also used to limit the service area of shared vehicles and the number of hybrid vehicles; however, this regulation was repealed in 2018.<sup>56</sup>

## COVID-19

Planning experts in Greater Montreal noted that during periods of crisis, such as the COVID-19 pandemic, it is actually easier to test and implement mobility innovations. At the same time, the pandemic has introduced new challenges. Connecting Montreal's airport to downtown via the LRT was one of the objectives of the REM project; however, in August 2020 Aéroports de Montréal (ADM) suspended the development of its LRT station due to financial losses caused by the COVID-19 pandemic. The provincial government provided \$600 million towards the project in funding in April 2021.<sup>57</sup>

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# 29%

congestion level of  
Montreal in 2019.

THIS MEANS THAT A RIDE WAS 29% LONGER THAN IT COULD BE ON UNCONGESTED ROADS, ACCORDING TO TOMTOM DATA.



# Montreal SWOT Analysis



## STRENGTHS

- Strong movement towards vehicle electrification, automation, and sharing, as well as significant investment in public transit and incentives for private electric vehicles.
- Relatively high public-transit ridership, and a history and high adoption rate of shared transportation modes.
- Montreal is a leader in developing and implementing public bikeshare systems (Bixi) and has recently implemented bike sharing for goods delivery.
- Innovative financing used to both plan and build large-scale infrastructure projects, as well as early and gradual investment in infrastructure, gives the City an edge in seeing the benefits of innovative transportation technologies.
- A centralized planning authority allows for more strategic transportation planning, while its regional governance model eliminates the City's dependency on changing political climates.
- Strong organizational culture of willing collaboration across public, private and academic sectors.



## WEAKNESSES

- Congestion and suburban development patterns affect the quality of life and connectivity of the region, limiting progress towards reducing greenhouse-gas emissions.
- The COVID-19 pandemic revealed the vulnerability of financing in transportation projects. The ensuing economic slowdown has resulted in the REM project being scaled down.



## OPPORTUNITIES

- The \$50-million Smart Cities Challenge award can significantly improve the quality and accessibility of Montreal's transportation system.
- The presence of major research universities and research-and-development companies is a fertile ground for innovation, collaboration, and attracting new talent.



## THREATS

- Most incentives for private-vehicle electrification and support for car-sharing comes from the provincial government, not the City. A change in provincial priorities may have a negative impact on these initiatives within Montreal.
- Suburban sprawl threatens to delay or prevent the region from meeting its emission targets.

# Montreal Municipal Innovation Index

## ACTIONS AND POLICIES:

	Absent	Research	Plan	Pilot	Practice	
<b>SUPPORT SUSTAINABILITY</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Private vehicle electrification						Provincial incentives, public electric charging stations
Public transit electrification						No diesel buses by 2029 plan implementation
Carshare						Shared vehicles downtown parking
Bikeshare						Bixi Montréal
Shared electric micromodes						Bixi Montréal e-bikes
Mode integration						Smart City Challenge award
Smart land use						The Metropolitan Land Use and Development Plan

## INNOVATE WITH TECHNOLOGY

	1	2	3	4	5	
Vehicle-to-vehicle communication						Universities and private companies research
Vehicle-to-infrastructure communication						REM operation
Autonomous technology						AV shuttle pilots in 2017, 2019
On-demand transit service						Blaise modelling for STL
Trip planning						STM Travel Planner, Plani-Bus STO
Smartfare						Opus (Smartcard)
Data sharing						Montréal Données Ouvertes

## ADVANCE PUBLIC GOOD

	1	2	3	4	5	
Equity						Transit Generalized Cost Equity Modelling
Accessibility						ARTM new fare plan
Public-private partnerships						Development of REM
Health and safety						Zero-emission zone downtown by 2030
Mobility pricing						ARTM new fare plan

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# HALIFAX REGIONAL MUNICIPALITY

The Warden  
of the North

POPULATION | 403,131 (2015)

1

AREA | 5,490.35 km<sup>2</sup>

2

POPULATION DENSITY | 73.4 p/km<sup>2</sup>

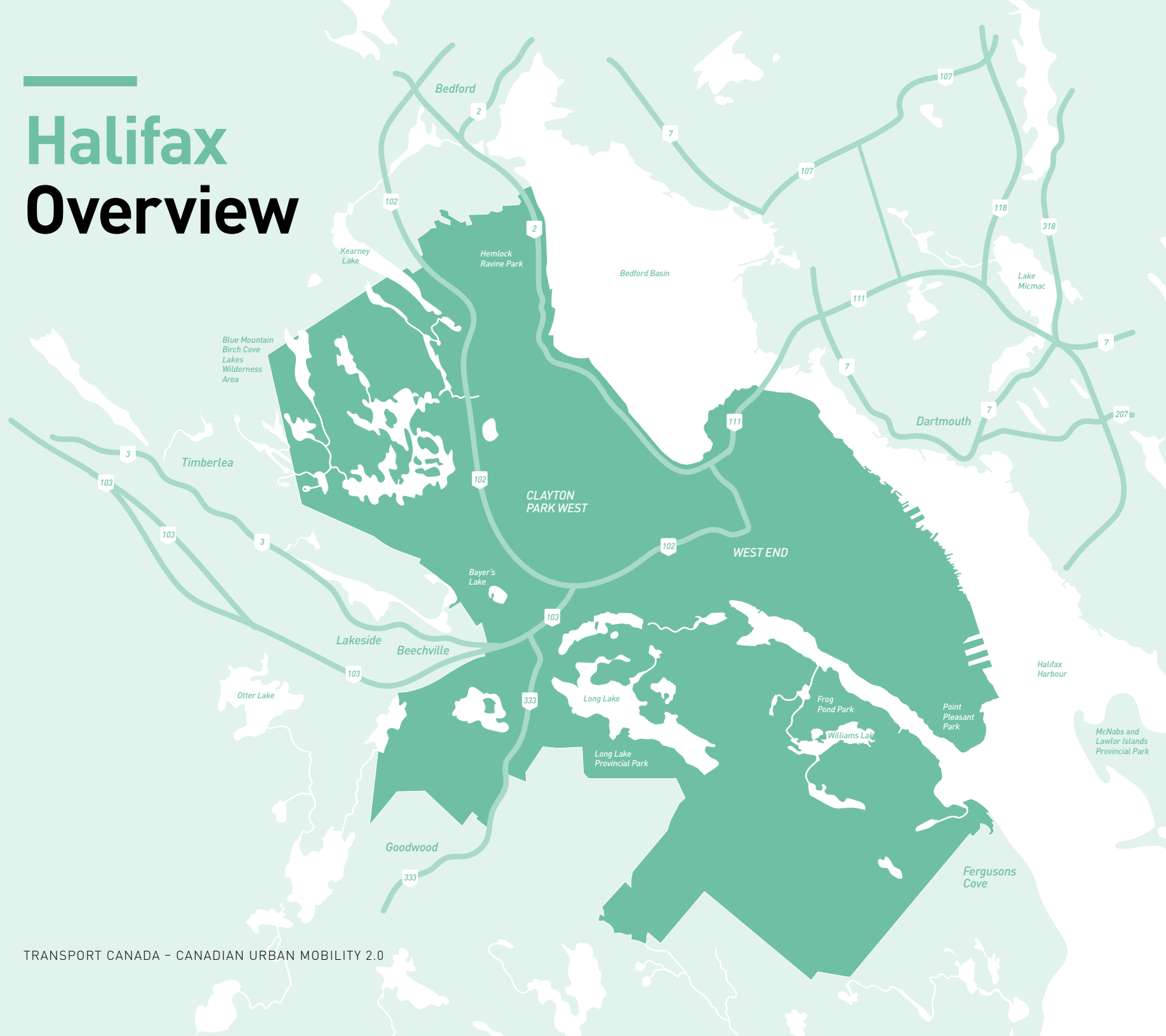
3

MEDIAN HOUSEHOLD INCOME | \$69,553

4



# Halifax Overview



Halifax, officially known as the Halifax Regional Municipality, is the capital of Nova Scotia and the most populated area in the province.

It consists of four former municipalities—Halifax, Dartmouth, Bedford, and Halifax County—that were amalgamated together in 1996. Halifax is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People, which is covered by the “Treaties of Peace and Friendship” that Mi'kmaq and Wolastoqiyik (Maliseet) People first signed with the British Crown in 1725. Geographically, Halifax is located in the southern half of Nova Scotia and includes a lengthy and winding shoreline, facing the Atlantic Ocean, that is dotted with numerous inlets. Halifax's location, both on an island and as part of the Canadian Maritimes, is an essential factor that shapes not just the municipality's culture and politics—it is well known, for example, for its role in Canadian naval history—but also its urban planning.

# Halifax Mobility Overview

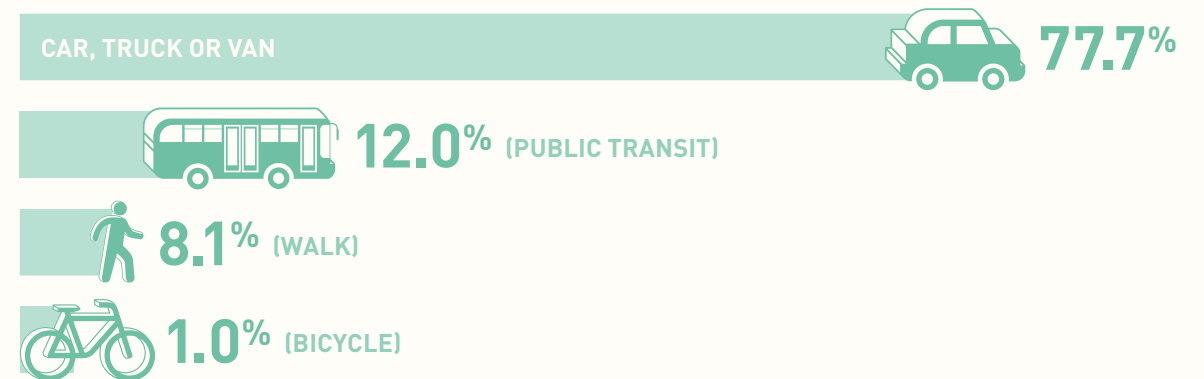
**MOTOR VEHICLES ARE THE DOMINANT** mode of transportation in Halifax, with 77.7% of residents commuting primarily via car, truck, or van. Another 12% of Haligonians commute via public transit, which includes buses, ferries, and paratransit, and is operated by Halifax Transit. A monthly public-transit pass in Halifax costs \$82.50.

Planners in Halifax describe a municipality that tries to balance delivering traditional mobility services with investing in innovation and new ways of thinking. As a mid-sized municipality, Halifax tends to wait for one of the larger centres in Canada to introduce and test new mobility innovations before implementing them themselves.

“Because we are a bit of a smaller system, we can only tackle so many projects at a time. So it’s more about prioritization rather than cautiousness.”

— A HALIFAX PLANNER NOTING THE DIFFERENT BETWEEN THEIR REGION AND OTHER REGIONS IN CANADA

## MAIN MODES OF COMMUTING IN HALIFAX (2016 CENSUS)



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# Halifax Innovations

## MOTOR VEHICLES

Since 2017, major progress has been made in Halifax's road safety through a combination of engineering, education, and enforcement measures, as well as increased opportunities for safety analysis and evaluation due to the municipality's transitioning from paper to digital reporting when it comes to collisions on public roads.<sup>5</sup> Halifax has also developed a GIS map service and released its collision data online for open access.<sup>6</sup>

There are currently roughly 500 electric vehicles in Nova Scotia, and more than 160 public charging stations. The province offers rebates of \$3,000, on top of the federal subsidy, for the purchase of new electric cars.<sup>7</sup> Halifax, however, had only 40 charging stations as of 2019, and a City report recommended that this number be increased to 2,000 to accommodate anticipated growth over the next decade.<sup>8</sup>

In 2020, Nova Scotia Power created the Smart Grid Nova Scotia pilot program, which equipped roughly 100 households with electric chargers. The program works in two stages: first, participants pay \$350 for a smart charging system, and then, if they agree to participate in the two-year pilot, they receive a \$500 rebate in exchange for providing data and control of the charging to Nova Scotia Power. Through this program, the utility aims to learn more about how to manage and distribute peak demand for electricity, while pilot participants are guaranteed that their vehicles are fully charged each morning.<sup>9</sup> However,

critics have pointed out that installing charging equipment is more expensive and complicated at places like apartment buildings, where there is no clear guidance in existing building codes, and that these additional costs fall on the end user.<sup>10</sup>

Halifax has also shown some support for carsharing. There are dedicated carsharing parking spaces in both downtown Halifax and Dartmouth (part of the Halifax Regional Municipality), where space is at a premium.<sup>11</sup> In 2019, CarShare Atlantic became the first company in Canada to introduce shared vehicles for people with disabilities: one accessible van and three cars with hand control. This expansion was the result of support from the Halifax Department of Community Services grant and the province's Business Access-Ability Program.<sup>12</sup>

Autonomous-vehicle pilots have not yet been conducted in Halifax; however, the 2018 revision of the provincial Motor Vehicle Act introduced provisions, through the Traffic Safety Act, for this technology to be deployed when it is ready.<sup>13</sup> At the same time, scenario planning and modelling has shown that allowing autonomous vehicles into the municipality could increase the amount of vehicle kilometres travelled from 1% to 4%, and the number of trips without passengers from 2% to 8%.<sup>14</sup>

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**“We’re a very old city with a very narrow right of way. So we’re trying to fit a lot into our right of ways.”**

– A HALIFAX PLANNER NOTING THE GEOGRAPHIC REALITIES OF THE REGION



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# Halifax Innovations (continued)

## PUBLIC TRANSIT

Halifax's 2020 Rapid Transit Strategy laid out plans for four rapid-transit bus lines and three new ferry routes over the next eight years, with a total development cost of \$297–\$342 million and \$15–\$22 million in projected operational costs once all routes are implemented.<sup>15</sup> Halifax Transit also installed automatic passenger counters across its network beginning in 2017.<sup>16</sup> A feasibility study of new ferry routes, meanwhile, recommended an expansion involving three 150-passenger ferries with a projected ridership of 1,400 additional users per day.<sup>17</sup> The feasibility of a commuter rail in the region was studied in 2015, but the idea was abandoned in 2019 due to the high costs and low projected ridership.<sup>18</sup>

The Rapid Transit Strategy also plans to begin electrifying Halifax's bus fleet starting in 2022.<sup>19</sup> This was shown to be a cost-efficient option as early as 2017, but was not considered a priority at the time, with the municipality even declining to participate in the Pan-Canadian Electric Bus Demonstration and Integration Trial.<sup>20</sup> In the meantime, the municipality signed a contract in 2020 to procure 150 new diesel buses over the next three years.<sup>21</sup> Planners in Halifax mentioned that there are a variety of ways to reduce the environmental impact of transit, with electric buses being just one of many options they are considering.

Halifax introduced the Transit Technology Program in 2012 as a five-year initiative to complete 33 projects across the municipality. Over the years the list was consolidated to nine major projects, two of which were completed as of 2021. The remaining projects are either in progress or on hold.<sup>22</sup>

In 2014, Halifax created the Rural Transit Funding Program to provide an alternative operational model for transit services in rural areas. This program provides community-based transportation services with annual grants (of \$5,000 or \$10,000) and a flat-rate subsidy of \$0.50 per kilometre serviced. Four providers received a total of \$324,500 through the program in 2019.<sup>23</sup>

Planners in Halifax mentioned that the municipality's GoTime departure-display system, an innovative measure first introduced in the 1970s, has been gradually replaced with a more modern system called Departures. Halifax has also installed automated passenger counters on every bus in its fleet, leading to more comprehensive passenger data.

Halifax's paratransit service, Access-a-Bus, received a software update in 2018, which led to an increase in service efficiency from 1.8 to 2.07 trips per hour; however, this is still not enough to satisfy existing demand.<sup>24</sup> The number of accessible taxis has actually decreased in recent years, from 47 taxis in 2015 to just 11 in 2021. This decline has been attributed to the high cost of procuring and operating these vehicles.<sup>25</sup> The municipality has recently agreed to fund the operation of 10 additional on-demand accessible taxis.<sup>26</sup>

## ACTIVE MODES AND MICROMOBILITY

Halifax doesn't currently have a bikesharing system. A 2015 feasibility study concluded that due to the relatively small size of the municipality, such a system would require financial subsidies to operate.<sup>27</sup>

E-scooters, however, have been available since 2019. A local vendor, HFX e-Scooters, operates 32 kick scooters across three different locations in downtown Halifax.<sup>28</sup> According to the municipality, this company technically operates in the grey zone of regulation: riders could technically be fined under the current Motor Vehicle Act, while the new Traffic Safety Act, which may introduce provisions for e-scooters, hasn't yet been enacted. Several municipal bylaws would have to be adapted to formally allow kick scooters in the city. In the meantime, three global companies have expressed potential interest to enter the Halifax market.<sup>29</sup>

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**“When Halifax  
does a project,  
they do it right.”**

– A HALIFAX PLANNER NOTING THE REGION'S  
HIGH LEVEL OF SUCCESS IN IMPLEMENTING  
NEW MOBILITY INNOVATIONS DUE TO  
UPFRONT PROJECT MANAGEMENT

# Halifax

## Other Factors

### DIFFERENT GENERATIONS, SAME NEEDS

The Halifax Regional Municipality expects to double its population of people aged 65 and up by 2031, and that some of those residents will move out of suburbs and into the region's centre. At the same time, 25% of the municipality's population is between 21 and 34 years old, and this demographic prefers modes of transportation other than private cars. Combined, these two demographics are driving the demand for better transit service in Halifax.<sup>30</sup>

### SMARTTRIP PROGRAM

Since 2013, Halifax Transit has promoted and supported transportation modes other than private vehicles through partnerships with major regional employers (accounting for more than 19,000 people in the region). This is called the SmartTrip Program. Projects resulting from these partnerships include discounted annual transit passes, guaranteed transportation home, flexible work schedules, and an online platform for ridesharing and educational sessions.<sup>31</sup>

### ACCESSIBILITY

Halifax introduced its Accessibility Strategy in April 2021, which calls for major improvements to its transportation network. These include being able to book paratransit trips online, converting bus stops to be more accessible, and bringing accessible taxi service to the municipality.<sup>32</sup>

### LAND-USE BYLAW

Halifax adapts its land-use planning to help integrate its transportation needs and mitigate their impact. The municipality is planning its future growth to be concentrated in dedicated nodes and corridors, with new developments to be evaluated using transportation impact studies and the creation of Transportation Reserve zones to improve the region's connectivity in the future.<sup>33</sup>

### COVID-19

To accommodate the needs of businesses during the COVID-19 pandemic, Halifax created temporary loading spaces and allowed for the first 15 minutes of on-street parking to be free.<sup>34</sup> The municipality also noticed that bicycle ridership increased by 43% during the pandemic, and in response introduced new multi-use pathways and created new snow-removal standards for paths dedicated to active transportation.<sup>35</sup> Planners reported significant delays to their usual work due to COVID-19, but also an atmosphere of moving quickly and innovatively to solve pandemic-related problems, as well as an eagerness to learn from those approaches in future years.

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**“We had a new and small sort of tactical urbanism, a program that had been around for a year or so. And that just went on steroids when COVID-19 hit.”**

– A HALIFAX PLANNER WHEN ASKED HOW COVID-19 HAS AFFECTED THE REGION'S MOBILITY INNOVATION ASPIRATIONS

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# Halifax Challenges

## SUBURBAN SPRAWL AND LACK OF CONNECTIVITY

Years of suburban growth in Halifax have resulted in long commute times and an overall dependence on cars. There is also a lower level of provision for pedestrian and cycling infrastructure in the region, mainly due to the difference in planning practices between the municipalities before their consolidation in 1996, as well as the auto-centric development of business parks in the area. This has resulted in several areas that need to be adapted to the needs and preferences of the modern population.<sup>36</sup>

## RURAL NATURE

Certain rural centres in Halifax have Park and Ride stations and express commuter buses; however, many other communities outside of the urban core and suburban belt cannot be serviced by transit due to low density and connectivity. At the same time, while there are many recreational trails suitable for active transportation, few dedicated routes exist for daily commuting.<sup>37</sup>

## CLIMATE RESILIENCE

Due to the geography of the region and its coastal nature, the impacts of extreme weather events are felt even more keenly in Halifax. The municipality's sea level is expected to rise up to 13 centimetres by 2030.<sup>38</sup> Storms in the area are already affecting people's ability to travel, while the worsening freeze-thaw cycle deteriorates roads and drives up the costs of repairs.<sup>39</sup> Planners expect these conditions to only become more acute in years to come.

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# 75%

reduction of  
emissions by 2030.

HALIFAX'S GOAL IS MORE AMBITIOUS THAN THE PROVINCE'S TARGET OF 53% EMISSIONS DECREASE (HALIFACT 2050: ACTING ON CLIMATE TOGETHER).

# Halifax SWOT Analysis



## STRENGTHS

- Provincial support of private-vehicle electrification through incentives and pilots.
- Dedicated efforts to providing transit to rural areas and for people with disabilities.



## WEAKNESSES

- Lack of flexibility with municipal regulations to safely deploy innovative mobility solutions.
- There is a stark difference between the urban, suburban, and rural parts of the region, which creates challenges when planning for and delivering transportation services equitably.



## OPPORTUNITIES

- Enacting the new Traffic Safety Act can allow for micromobility and autonomous vehicles to be operated in the province.
- Implementing the municipality's Rapid Transit Strategy will help electrify its bus fleet and significantly increase transit accessibility in the region.
- The municipality is exploring alternate transit service-delivery models to improve connectivity to its rural communities.
- The 2021 Accessibility Strategy could significantly improve transportation for people with disabilities and an aging population.



## THREATS

- Climate change will only increase the frequency and severity of extreme weather events and rising sea levels, which increases costs to the region's transportation system. Planners may also need to consider the life-cycle costs of resiliency, investments, and savings in budgeting and innovative design.
- Failing to account for changing demographics and transportation tastes while planning new infrastructure and services can result in unmet transportation needs for numerous residents in the future.

# Halifax Municipal Innovation Index

## ACTIONS AND POLICIES:

	Absent	Research	Plan	Pilot	Practice	
<b>SUPPORT SUSTAINABILITY</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Private vehicle electrification				█		Smart Grid Nova Scotia Program
Public transit electrification			█			Rapid Transit Strategy
Carshare					█	Dedicated parking downtown
Bikeshare		█				Staff research
Shared electric micromodes		█				Staff research
Mode integration			█			Integrated Mobility Plan
Smart land use			█			Centre plan
<b>INNOVATE WITH TECHNOLOGY</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Vehicle-to-vehicle communication	█					No information on plans, pilots, or projects
Vehicle-to-infrastructure communication	█					No information on plans, pilots, or projects
Autonomous technology		█				Revision of Motor Vehicle Act by the Province
On-demand transit service			█			Use of accessible taxis to supplement paratransit
Trip planning					█	Google Transit
Smartfare					█	Halifax Transit EPass (SmartTrip employers only)
Data sharing					█	Halifax Open Data
<b>ADVANCE PUBLIC GOOD</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
Equity					█	Rural Transit Funding Program
Accessibility					█	Accessible carsharing
Public-private partnerships					█	SmartTrip Program
Health and safety					█	COVID-19 mobility provisions
Mobility pricing	█					No information on plans, pilots, or projects

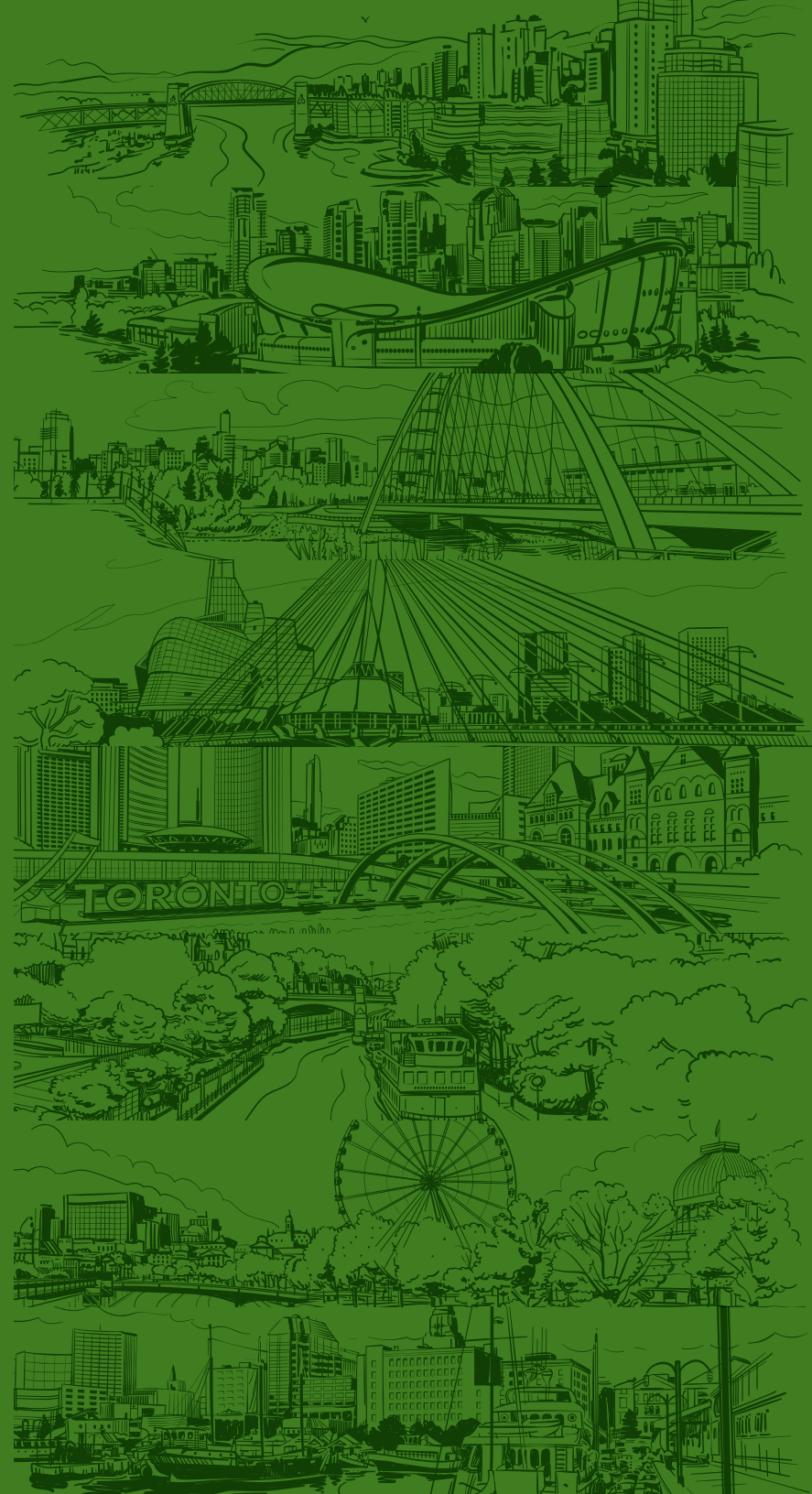
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# CONCLUSION

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## Recommendations and Reflection



# Conclusion

**IN STUDYING POLICY DOCUMENTS** and speaking with more than two dozen planning professionals across Canada, we heard about many innovations that are currently being used on the streets and sidewalks—as well as within the planning departments—of every municipality. Obviously, the approaches and results vary from one municipality to the next, as each urban centre has unique needs, priorities, geographies, and budgets to consider. But no matter the context, we were heartened to see innovations already happening in urban mobility from coast to coast. It's clear that Canada as a whole already contains a vast amount of knowledge in this area, and it is our hope that planners from all municipalities, large and small, can share and build off of that knowledge in order to further improve mobility, increase sustainability, and create cities that are accessible for all.

The following recommendations are drawn from both our document research, as well as conversations with 25 planning professionals from all eight municipalities. They include at least one successful real-world example already being implemented by each municipality. We hope these recommendations provide valuable direction for planning professionals who are looking for innovative approaches to urban mobility, not just in Canada but around the world.

## RECOMMENDATIONS

**PUT THE PUBLIC INTEREST FIRST.** It's tempting to try every new technology out there, but the benefits of these investments to the public should always be evaluated against their costs. One way of doing this is Ottawa's development of the Neighbourhood Equity Index, which helps evaluate how transportation projects affect the access and use of mobility throughout the city. New transportation projects in Edmonton, meanwhile, are being assessed through the specific lens of gender. When planning for transportation innovation, existing city strategies and plans should be consulted to identify the areas that will benefit from the project, and to make sure that these benefits are distributed equitably among all residents. By placing people at the centre of innovation, municipalities can ensure that new technologies improve quality of life, and are not purchased simply because they are available.

**THINK BIG, BUT START SMALL.** Given the speed of technological development, pilot projects are a useful way to learn about the benefits innovation brings, as well as any challenges that might arise. This is how Vancouver approaches the gradual replacement of its bus fleet with electric vehicles, and how Calgary tested the feasibility of on-demand buses to serve low-density neighbourhoods. This gradual approach allows municipalities to make informed decisions about solutions that serve their needs, while also ensuring flexibility when it comes to standards and provider specifications.

## PUT YOUR MONEY WHERE YOUR MOUTH IS.

Budgets are always top of mind for municipalities, and that's why it is important to always seek opportunities from different levels of government, the private sector, and academic institutions to help fund mobility-innovation projects. Since 2011, Calgary has dedicated 1.1% of its annual transportation budget towards its cycling strategy, and since then has seen a significant increase in the use of active modes. This is also a good reminder that only sustained funding, covering the full life cycle of the program (from planning to execution to management), can ensure its continuous progress and success. Finally, it is important to remember that it isn't just a project's hardware and software that needs updating, but also the knowledge and skills of the people who are to work with it and maintain it.

**THINK HOLISTICALLY.** Effective mobility innovations require comprehensive thinking and decision-making. Policies around parking regulations, for instance, must go hand in hand with strategies for electrifying City fleets and private vehicles—a strategy showcased by the City of Vancouver. On the other hand, even the best technologies cannot change the existing realities of city streets. In most cases, an electric autonomous 40-foot bus is a more effective mode of transportation than 40 single-occupied automated electric cars.



# Conclusion

**BUILD INTERNAL AND EXTERNAL PARTNERSHIPS.** In developing mobility-innovation projects, make sure that no department is left out. In Ottawa, economic-development professionals ensure that local entrepreneurs work on autonomous-driving technologies while public works build this capacity into its ongoing infrastructure upgrades. At the same time, municipalities should seek out larger companies interested in investing their expertise and solutions, as in the case of on-demand shuttles in Edmonton's Airport City, or utility companies preparing for changes in demand for electric energy in Halifax. Greater Montreal, meanwhile, emphasizes partnerships with academic institutions, as well collaboration with neighbouring municipalities, to create a seamless mobility experience for residents who travel across the region. It is also important for different levels of government to synchronize their roles and responsibilities, as Manitoba does with its Vehicle Technology Testing Act, to provide a legislative framework that supports the safe deployment of new technologies.

**TRACK YOUR PROGRESS AND SUPPORT TRANSPARENCY.** Investing in ongoing monitoring efforts is an important way to understand the current conditions, demands, and potential changes for a municipality's transportation system. This data should be collected regularly, and in a way that uses all relevant metrics, as in the City of Vancouver's annual transportation survey. It is also important to make sure that data from private transportation companies is accessible—Calgary not only had access to trip data during the first year of its electric-scooter pilot, but also made this data available to the public, allowing for informed planning, decision-making, and evaluation of the program. Moreover, this open approach informed public outreach and education about the benefits of electric scooters and advocated for its continuing support.

**REMEMBER THAT NOT ALL INNOVATION IS TECHNOLOGICAL.** Municipalities need to make sure that all investments in new technologies also further proven strategies like transit priority lanes, supporting bike-sharing and developing cycling infrastructure, and transit-oriented development. In Winnipeg and Halifax, projects that prioritize accessibility and mobility through frequent high-capacity transit corridors offer an important lesson in how proven technology can lead to innovative results.

**SHARE YOUR EXPERTISE AND LEARN FROM OTHERS.** In an ideal world, every new technology would come with a playbook and a white paper on its deployment and management. But in reality, municipalities innovate in different areas, based on their unique expertise, challenges, and opportunities. That's why we encourage municipalities to document and share their experiences with mobility innovation, so that their peers don't have to start from scratch when it is time to implement that same innovation. Toronto's studies of electric buses are already being used by other municipalities, as are the broader policies for electrifying public vehicles drafted jointly by Calgary and Edmonton. Whenever innovation projects are being funded, this should include dedicated funding to document and evaluate the project.

# Conclusion

## REFLECTION

It's no bold statement to say that municipalities need to be run with caution. In fact, these organizations are cautious by design: needing above all to ensure that their citizens are kept safe, and that public funds are spent wisely and for the common good. At the same time, as this report has illustrated, there is a growing need for municipalities to innovate—in the world of urban mobility specifically, but also in a larger, more general sense. Innovation can yield tremendous results, but it also comes with risks and uncertainty. After researching mobility developments and speaking with twenty-five planning professionals, in municipalities across the country, we kept returning to a single question: How can innovation grow within bureaucratic structures that are typically risk-averse?

We were pleased, over the course of our research, to confirm that many of Canada's larger urban centres have already created entire positions, or even

departments, dedicated to innovation (as it relates to mobility or otherwise). This is a strong first step. Ultimately, however, the goal of these initiatives should not be to centralize innovation—to hand the job of thinking creatively to a handful of people and then let everyone else go back to business as usual. Rather, the goal should be to *decentralize* it, and create a larger overall culture of innovation that is encouraged across the entire organization.

It's also important to note that innovation is a broad concept. It needn't refer only to the latest technology or application. Municipalities should also embrace innovative thinking within their organizational structures, their engagement strategies with the public, and their policy reviews. A good example of this is the City of Edmonton using a gendered lens during its recent bylaw and land-use review. This is innovation in a different form, and internal strategies like Edmonton's could constitute fertile ground for future research on innovation as a culture within organizations.

As mentioned above, municipalities must be cautious. But they are also always changing. By finding a way to embrace innovation within their naturally cautious mindset, city-builders—including planners, leaders, and policy advisors—can help direct that change in a way that responds to citizen demands and creates a more efficient and equitable place for everyone. We would like to extend our thanks to all of the planners and related professionals who agreed to be interviewed; they provided a wealth of information about innovation in their municipalities, some of which was beyond the scope of this report. While there is far more work to be done in this field, we hope that this report provides a useful overview of the current state of urban-mobility innovations in Canada, as well as a clear indication that this issue is only going to become more important in the years to come.

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**“The future is already here – it's just not very evenly distributed.”**

– SCIENCE-FICTION NOVELIST WILLIAM GIBSON

# Appendix

# Interview

# List

NAME	CITY/REGION	ORGANIZATION	TITLE
Graham Cavanagh	Metro Vancouver	TransLink	Senior Planner, New Mobility
Cail Smith	Metro Vancouver	City of Vancouver	Transportation Planner
Mirtha Gamiz	Metro Vancouver	TransLink	Senior Planner, New Mobility
Andrew Sedor	Calgary	City of Calgary	Transportation Strategist - Transportation
Jonathan Lea	Calgary	City of Calgary	Senior Transit Planner
Daniel Vriend	Edmonton	City of Edmonton	General Supervisor, Mobility Strategies
Don Iveson	Edmonton	City of Edmonton	Mayor of Edmonton / Chair - Big City Mayors' Caucus
Olga Messinis	Edmonton	City of Edmonton	Director, Traffic Operations
Erin Cooke	Winnipeg	City of Winnipeg	Project Manager, Bus Electrification Program
Kevin Strugeon	Winnipeg	City of Winnipeg	Senior Transit Planner
Adam Budowski	Winnipeg	City of Winnipeg	Transit Planner
Michael Hain	Greater Toronto	City of Toronto	Manager, Transportation Planning Policy & Analysis
James Perttula	Greater Toronto	City of Toronto	Director, Transit & Transportation Planning
Ryan Lanyon	Greater Toronto	City of Toronto	Manager, Strategic Policy & Innovation
Lindsay Wiginton	Greater Toronto	City of Toronto	Project Manager, Strategic Policy & Innovation
David MacIsaac	Halifax	Halifax Regional Municipality	Supervisor, Active Transportation
Patricia Hughes	Halifax	Halifax Regional Municipality	Manager, Planning & Scheduling at Halifax Transit
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Pierre Gingras	Greater Montreal	Société de Transport de Montréal	Executive Director of Information Technology & Innovation
Nicolas Filion	Greater Montreal	Agence de Mobilité Durable	Director of Technology
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Omar Choudhry	Ottawa-Gatineau	City of Ottawa	Project Lead, Transportation System Management
Jennifer Armstrong	Ottawa-Gatineau	City of Ottawa	Program Manager, Transportation Policy & Networks
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François Pirart	Ottawa-Gatineau	Ville de Gatineau	Active Transportation Coordinator