

Low-Carbon Mobility Actions for Canadian Municipalities: COVID-19 Companion Report

February 2021



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About

Pollution Probe

Pollution Probe is a national, not-for-profit, charitable organization that exists to improve the health and well-being of Canadians by advancing policy that achieves positive, tangible environmental change. Pollution Probe has a proven track record of working in successful partnership with industry and government to develop practical solutions for shared environmental challenges.

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The Delphi Group is a Canadian strategic consultancy providing innovative solutions in the areas of climate change and corporate sustainability. As a pioneer in sustainability and environmental risk management, The Delphi Group has more than 25 years of experience in helping some of Canada's best-known companies improve the sustainability of their organizations – as well as the local and global communities in which they operate.

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City of Calgary

City of Toronto

City of Vancouver

Green Municipal Fund, Federation of Canadian Municipalities

Halifax Regional Municipality

Halifax Transit

Lyft

Toronto Transit Commission

Transit App

University of Toronto, Transportation and Air Quality Research Group (TRAQ)

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Executive Summary

In March of 2020, Pollution Probe and The Delphi Group finalized a study entitled *Opportunities for Low-Carbon Mobility Actions in Canadian Municipalities: Best Practices and Guidance*. This comprehensive study explored a wide variety of collaborative actions that Canadian cities can lead to encourage the use of zero emission vehicles (ZEVs) across all modes of transport to address greenhouse gas (GHG) and air pollutant emissions and alleviate congestion.

Since the study's completion, urban mobility trends and practices have been dramatically upended due to the global COVID-19 pandemic. Lockdowns, layoffs and work-from-home policies in major urban centres have caused traffic levels to plummet. Social distancing mandates and virus-related fears have led travellers to avoid public transit. Early indicators suggest that people are viewing privately-owned vehicles as the safest mode of travel, threatening to reverse the decades-long trend of declining vehicle ownership levels in cities.

Cities around the world have implemented measures to provide pedestrians and cyclists with additional space in which to move, often necessitating the narrowing of roads or their closure to vehicle traffic. Transit agencies have likewise moved rapidly to adapt to the pandemic, through actions such as limiting occupancy to allow for social distancing, making face coverings mandatory, protecting vehicle operators behind barriers and increasing sanitation measures. While essential from a public safety perspective, these actions as well as others explored in this report may have lasting impacts on municipal government and transit agency planning and best practices.

This report revisits some of the actions explored in the original report in light of the dramatic impacts of the pandemic on transportation systems globally. Its purpose is to share guidance and best practices, and identify barriers and challenges faced by municipalities and transit agencies across Canada as they respond to, and recover from, the global pandemic.

Section 1 of this report looks at transportation-related pandemic impacts and responses from a municipal government perspective, while Section 2 looks at the same factors from the perspective of public transit agencies. Section 3 launches into a discussion on key issues raised, including:

- Pandemic-related impacts on municipal transportation networks that have the potential to remain permanent (e.g., teleworking, active transportation usage);
- Discouraging personal vehicle use;
- Increasing usage of active transportation and micro-mobility options;
- Assessing and implementing transit-on-demand services;
- Accelerating the electrification of passenger vehicles;
- Supporting off-peak deliveries; and
- Addressing inequities in transportation networks.

The report's concluding thoughts highlight the following points as **key findings and areas for future research**:

- Remedial actions taken by cities throughout Canada and globally were largely consistent, indicating that municipal governments were following the advice of medical experts.
- Impacts on urban transit systems, and actions taken in response, were also largely consistent around the globe.
- Findings based on transit ridership numbers, epicenters of outbreaks, etc., indicate that COVID-19 is largely a blue-collar disease. This suggests that cities should prioritize near-term mobility actions that explicitly address challenges faced by low-income, marginalized communities.
- Cities are prioritizing and expediting actions to make active transportation a safe, reliable and accessible option. This not only benefits transportation network emissions, but also human health and quality of life.
- Cities in Canada and globally are not cancelling transportation decarbonization plans and targets as a result of the virus, but funding is a major issue, and has led to certain actions being delayed.
- People feel that privately-owned cars are the safest mode of vehicular travel, and evidence suggests car ownership levels in major cities is increasing. This being the case, governments should continue to prioritize passenger EV deployment actions and infrastructure, especially for low-income residents. Programs that offer facilitated access to credit for EV purchases, "right-to-charge" or public charging hub requirements, used EV rebates, etc., should be considered to address financial barriers to EV ownership.
- Teleworking presents major opportunities for urban planners and transportation managers. It is a trend that is likely to persist once the virus subsides. It presents a wide range of possible pros and cons, and it is critical that these are understood by cities and explicitly addressed in municipal planning and decision-making.

The report's appendix provides high-level updates on cities whose low-carbon mobility actions (LCMAs) were profiled in the initial report. It details key impacts and responses, and highlights best practices where applicable.

Contents

- Executive Summary 5
- Contents 7
- Introduction..... 9
 - Overview of Report Sections 10
- SECTION 1 – COVID-19 Impacts and Responses of Municipal Governments 12
 - Impacts of COVID-19 on Urban Mobility..... 12
 - Decreases in Overall Mobility 12
 - Impacts on Modal Choice 13
 - Municipal Government Responses 17
 - Road or Lane Closures..... 17
 - Slow Streets 18
 - Removal of On-Street Parking 18
 - Expansion of Active Transportation Infrastructure 18
- SECTION 2 – Transit Agency Impacts and Actions..... 19
 - Impacts of COVID-19 on Transit Ridership..... 19
 - Demographic Disparities 20
 - Impacts of COVID-19 on Transit Agency Financials and Planning 21
 - Revenue Decreases 21
 - Funding Support 22
 - Transit Agency Responses..... 23
- SECTION 3 – Discussion and Recommendations 26
 - Changes in modal choice and transit usage that are likely to remain permanent 26
 - Teleworking 26
 - Modal Selection 27
 - Opportunities for Municipalities in Pursuing Low Carbon Mobility Actions 28
 - Discouraging Personal Vehicle Use..... 29
 - Increasing Active Transportation and Micro-Mobility..... 29
 - Accelerating Electrification 30
 - Off-peak Deliveries 32

Micro-Transit/ Transit on Demand	33
Addressing Inequities in Transportation Networks	33
Barriers and Challenges Faced by Municipalities	36
Barriers and Challenges Faced by Public Transit Agencies	38
Concluding Thoughts	41
Appendix A: Municipal Best Practices – Updates on Cities Profiled in <i>Opportunities for Low-Carbon Mobility Actions in Canadian Municipalities: Best Practices and Guidance</i>	43
TORONTO, CANADA	43
LONDON, UK	45
PARIS, FRANCE	47
SINGAPORE, REPUBLIC OF SINGAPORE	48
NEW YORK CITY, USA	49

Introduction

This report details findings from a follow-up study conducted to assess the impacts of the COVID-19 pandemic on the municipal low-carbon mobility actions explored in the pre-pandemic study: *Opportunities for Low-Carbon Mobility Actions in Canadian Municipalities: Best Practices and Guidance*.¹ The original study explored a wide variety of collaborative actions that Canadian cities can lead to encourage the use of zero emission vehicles (ZEVs) across all modes of transport to address greenhouse gas (GHG) and air pollutant emissions and alleviate congestion. Four broad areas for municipal action to encourage the use of ZEVs were explored in detail: low-emission zones, restricted road access, parking space removal, and congestion pricing. An exploration of these broad areas for action was supplemented with 32 complementary areas on topics ranging from infrastructure and public transit, to active transportation, financial levers, regulatory instruments, partnerships, and urban planning and design.

This report revisits some of the actions explored in the original report in light of the dramatic impacts of the pandemic on transportation systems globally. Its purpose is to share guidance and best practices, and identify barriers and challenges faced by municipalities and transit agencies across Canada as they respond to, and recover from, the global pandemic.

This study, which was led by Pollution Probe and The Delphi Group with support from Natural Resources Canada, was undertaken during the latter half of 2020. Its findings are drawn from a global literature review and a series of interviews with transportation experts from municipal governments, transit agencies, civil society, and the corporate sector.

All ten Canadian provinces announced States of Emergency as a result of COVID-19 between March 14 and 22, 2020. Non-essential businesses including restaurants, bars, movie theatres and most retail stores closed, along with schools and daycare centres.² Where possible, employees were instructed to work from home. Flights were cancelled as borders closed around the world.

Through late spring and early summer, COVID-19 cases began to decrease and a phased-in approach to reopening was taken, with new controls in place. These varied by province, but typically included social distancing guidelines, limits on capacity in indoor and outdoor settings, and mask mandates. Stores began to offer curbside pick-up, and restaurants opened for take-out and delivery only. Schools and most workplaces remained closed. Increasing case numbers in the fall saw new, more targeted shutdowns, varying not only by province but also by municipality in some cases.

While the virus eventually reached every corner of the world, its impacts were not evenly distributed within nations. For example, it is well known that mortality rates were highest among senior citizens and those with compromised immune systems. Another impact which was highly

¹ [Pollution Probe](#)

² [Institute for Research on Public Policy](#)

pronounced in cities around the world, including those in Canada, was that COVID-19 infection rates were significantly higher in low-income neighbourhoods. These neighbourhoods are not only characterized by low household income levels, but also by overcrowding, inadequate transit service levels, and large populations of immigrants and people of colour. These are “working class” neighbourhoods in which many residents perform frontline, public-facing roles that are not possible to conduct via teleworking.³ It is important to note such discrepancies in impacts as governments at all levels strategize on the best approaches for mitigating long-term impacts on transportation networks as they attempt to “build back better”.

Overview of Report Sections

This report begins with an exploration of the impacts of COVID-19 on municipal transportation networks. Decreases in different modes of mobility are reviewed from a Canadian context, and prominent modal shifts catalyzed by the virus are summarized. Special attention is given to trends in teleworking, private vehicle ownership, and active transportation.

Section 1 provides a summary of the pandemic’s impacts on urban mobility, and municipal government responses, including road or lane closures, “slow streets,” the removal of on-street parking, and the expansion of active transportation infrastructure.

Section 2 explores the impacts on transit agencies in Canada, with a focus on ridership levels following March 2020 lockdowns, associated impacts on transit agency financials, additional challenges faced by transit agencies, and a summary of best practices in transit agency responses to the pandemic.

Section 3 begins with a discussion of pandemic-related impacts on municipal transportation networks that have the potential to remain permanent. These include increases in teleworking and active transportation usage, as well as a potential increase in household vehicle ownership rates in cities. Section 3 then looks at opportunities for municipal government actions to address challenges posed by the virus while continuing to address more systemic issues such as climate change. These include discouraging personal vehicle use, increasing usage of active transportation and micro-mobility options, assessing and implementing transit-on-demand services, accelerating the electrification of passenger vehicles, supporting off-peak deliveries, and addressing inequities in transportation networks. Barriers and challenges related to such actions are identified and discussed from municipal government and transit agency perspectives.

³ [The Globe and Mail](#)
[The Globe and Mail](#)
[CBC News](#)

Concluding thoughts summarize the key messages from the report. Appendix A provides high-level updates on actions being led by cities profiled in the original low-carbon mobility action (LCMA) report in response to the pandemic.

SECTION 1 – COVID-19 Impacts and Responses of Municipal Governments

Impacts of COVID-19 on Urban Mobility

Decreases in Overall Mobility

As businesses and schools shuttered and travel restrictions took effect in March 2020, there was a resulting immediate, steep decline in road, rail and air traffic. This is starkly apparent in Figure 1, based on aggregated Canadian location data.⁴

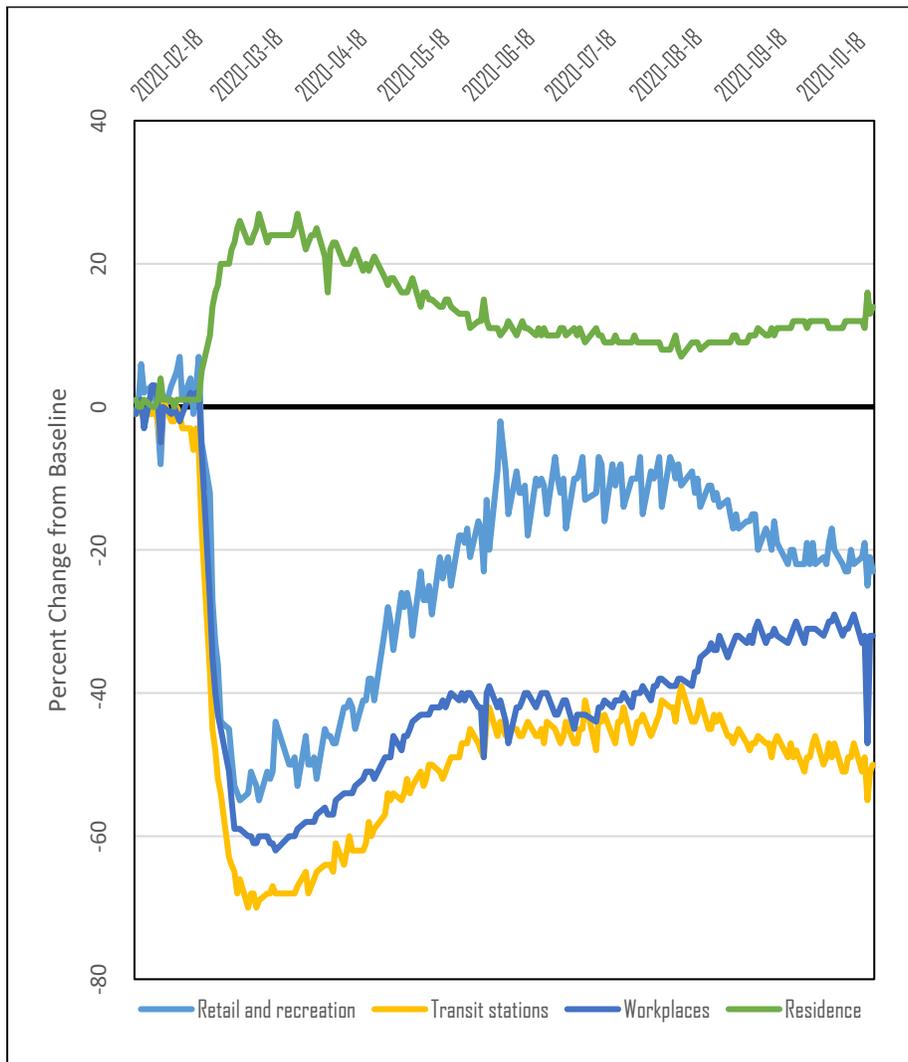


Figure 1: Mobility patterns of Canadians during and immediately following COVID-19-related lockdowns

⁴ [COVID-19 Community Mobility Report](#), Google.

Please note that the “Residence” category shows a change in duration of total time spent at home.

Traffic congestion reduced sharply across the country: photos of empty streets in downtown cores and vacant highways mirrored similar images from around the world. The International Energy Agency's Global Energy Review reported that on-road transportation activity was almost 50% below the 2019 average by the end of March 2020.⁵

Air quality followed suit as ground-level air pollution was reduced. A University of Toronto study found a clear correlation between transportation-related emissions and decreased mobility: during the first five weeks of the State of Emergency in the province of Ontario, both nitrogen dioxide and nitrogen oxides (NO_x) were found to be lower than at any time during the previous five years.⁶ As restrictions began to ease in the late spring and early summer, retail and recreational outings rebounded to within 10% of the pre-pandemic baseline, while workplace numbers remained low, hovering at over 40% below the baseline for much of the summer. Similarly, visits to transit stations – used a proxy for transit ridership – also remained low and began to decline again in the fall.

Impacts on Modal Choice

Information collected on the modal choice(s) of Canadians during the COVID-19 pandemic has largely focused on commuters. Findings consistently point to major changes in the commuting habits of public transit users as a result of the pandemic.

Statistics Canada surveyed Canadians who had a job prior to the pandemic and who were still working in June 2020 to assess changes in the mode of transportation of workers, including the switch to telework.⁷ The biggest change was in the latter category: teleworking increased more than fivefold. Among those still commuting to a workplace, it found that the greatest decrease was to transit, which declined by 77%. Personal motor vehicle use declined as well, but by only 11%. Active transportation and other modes did not change markedly.

⁵ [International Energy Agency](#)

⁶ Adams, M.D. (2020). Air pollution in Ontario, Canada during the COVID-19 State of Emergency. *Science of the Total Environment*. Vol. 742. Retrieved from:

<https://www.sciencedirect.com/science/article/abs/pii/S0048969720340389>

⁷ [Statistics Canada](#)

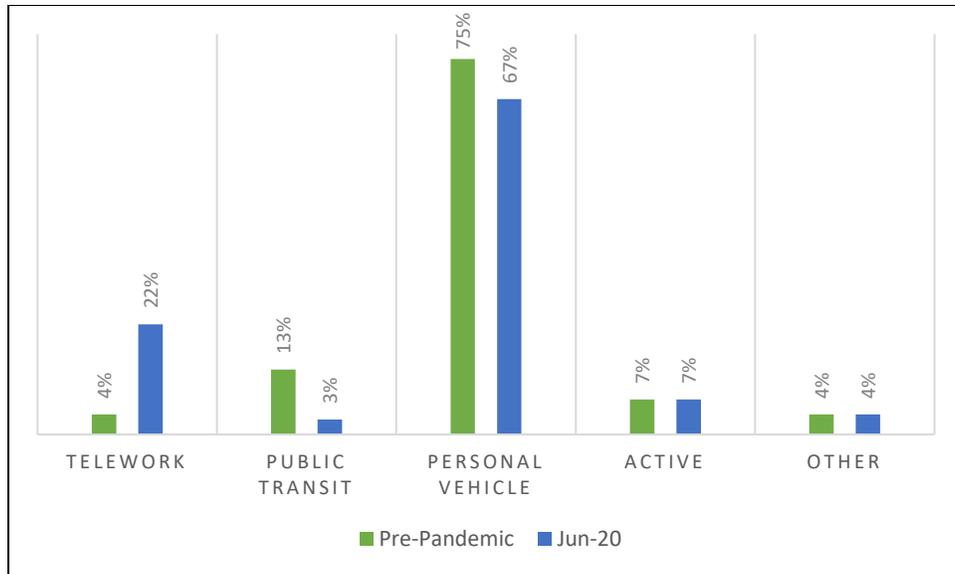


Figure 2: Changes in Modal Choice of Commuters, June 2020.

The survey found that among those commuters who were still commuting, 34% of those who had been public transit users switched to another mode of transportation, citing concerns about safety in relation to COVID-19. Just under three-quarters of these individuals began driving to work, and just over one-fifth switched to active transportation.⁸

There is a lack of data to characterize COVID-related mobility changes outside of commuting. While people are travelling less, when they do, personal vehicles are preferred over transit. Active transportation is on the rise, as is the use of micro-mobility in some areas. This will be further discussed in Section 3.

Teleworking

As part of their COVID-19 data series, Statistics Canada also studied the potential for Canadian workers to work from home both during and after the pandemic. It found that telework capacity varies little by province (from 31% in Prince Edward Island and Newfoundland and Labrador to 42% in Ontario), but greatly by industry (from 4% to 85%). Workers in trades such as agriculture, forestry, fishing, construction, manufacturing, mining and others are far less likely to be able to telework than those in professional, scientific, technical or financial services.⁹

This may be a contributor to another observable trend. During the COVID-19 pandemic, the percentage of commuters who had switched to teleworking in June 2020 varied significantly by size of municipality. Commuters in medium to large census metropolitan areas (populations of 500,000 and above) were much more likely to be teleworking than those in smaller cities.

⁸ [Statistics Canada](#)

⁹ [Statistics Canada](#)

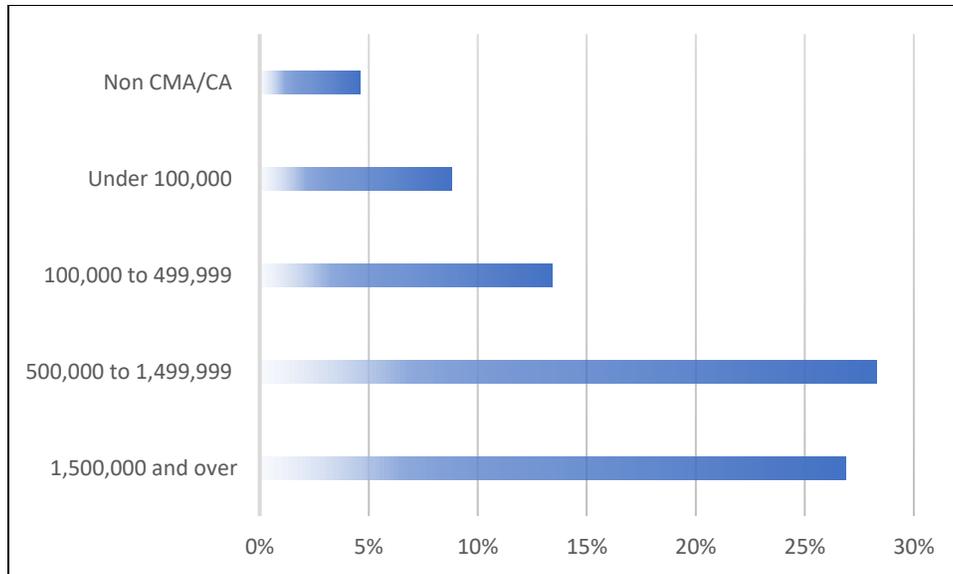


Figure 3: Commuters That Switched to Teleworking During the COVID-19 Pandemic

Finally, more financially vulnerable workers have the lowest telework capacities. These individuals are more likely to be in a position of having to commute while also being less likely to afford to own a personal vehicle and have less choice of housing in close proximity to place of work. As such, these individuals are more likely to have reduced options for modal selection.

Personal Vehicles

AutoTRADER surveyed 1,000 Canadians from across the country in March 2020 and found that of the respondents who don't own a motor vehicle, 14% are planning on purchasing one because of the pandemic, citing increased flexibility to travel and commute, the increased personal space, and control over cleanliness and hygiene.¹⁰ While the Canadian Automobile Dealers Association (CADA) reported a 75% decline in car sales in April, this was followed by a significant rebound in May and June, driven in part by younger, first-time car buyers. AutoTRADER.ca has seen consecutive months of record-breaking traffic on its website every month since May.¹¹

A McKinsey survey conducted globally (US, UK, Germany, France, Italy, Japan, and China) in September 2020 found that more than half of respondents travel less than before the pandemic; a third value constant access to a private vehicle more than before COVID-19; and a shift to private vehicle (from air and rail) for intercity travel was evident across all regions surveyed. That notwithstanding, it also reported that car sales dropped by 47% (US) to 80% (Europe) in the spring of 2020, and that while sales are recovering, the intent to purchase a car remains at 14% below pre-pandemic levels.¹² These statistics may be reflecting the impact of the pandemic on the

¹⁰ [AutoTRADER](#)

¹¹ [CTV](#)

¹² [McKinsey](#)

economic outlook and the ability and appetite of consumers to invest in a vehicle during uncertain times.

Active Transportation

American data analytics firm The NPD Group reports that sales in nearly all key bike categories have increased as a result of the pandemic, sometimes dramatically.¹³

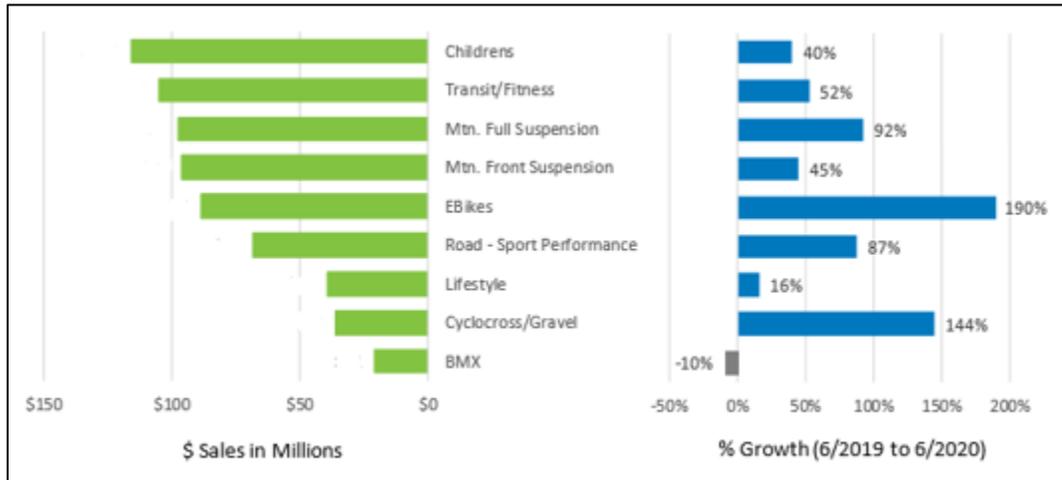


Figure 4: Changes in U.S. Bicycle Sales, June 2020. Source: The NPD Group.

Sales of bicycles have also surged across Canada. Bike shops from British Columbia¹⁴ to Montreal¹⁵ and beyond are reporting surges in sales of bicycles and in requests for repairs. An Ottawa bike shop owner interviewed for this project reported a 25% increase in total revenue. This reflected increases not only in sales of new bicycles, but also of related products (clothing, helmets, accessories) and in repairs. It is impossible to identify what proportion of this increase was as a result of increased recreational cycling, however as businesses and workplaces began to reopen, many customers indicated that they were preparing to start commuting again by bike, specifically to avoid taking public transit.¹⁶

Other Transportation Modes

The popularity of other modes of transportation including mobility-as-a-service (MaaS) and micro-mobility have depended heavily on municipal regulations, which vary significantly. MaaS includes ride-sharing services such as Uber and Lyft. Micro-mobility options include small motorized vehicles such as e-bikes and e-scooters. These may be privately owned but are often accessed as short-term curbside rentals. While e-bike sales are surging (similar to those of regular bikes), the

¹³ [The NPD Group](#)

¹⁴ [Global News](#)

¹⁵ [Global News](#)

¹⁶ Interview with Vince Caceres, Owner, [The Cyclery](#)

popularity of (and access to) shared micro-mobility options varies by location. Some Canadian cities have banned them outright (Montreal) while other cities are reporting record use (Calgary).^{17, 18}

A July 2020 McKinsey report found that while the use of shared and privately owned micro-mobility vehicles declined by 60% to 70% in Europe and the United States, a strong recovery is expected. This prediction is partially based on changing trip profiles, signalling a possible shift in the traditional usage patterns. These include longer trip distances and more trips originating within residential neighborhoods rather than core commercial districts.¹⁹ Some micro-mobility providers are responding by expanding the typical business model of curbside pick-up and drop-off to new revenue models such as subscription-based offerings. For example, Lime, a U.S. based micro-mobility provider that operates in Ottawa, Calgary, Edmonton and Victoria, has added both daily and monthly passes, along with a Corporate Partners Program to make their vehicles available to commuters.²⁰ Some international platforms such as Vogo and Bounce (India) are adding year-long subscriptions. Some providers are also considering health/ safety-related additions such as the self-cleaning handlebars rolled out by the bike-sharing start-up Wheels (in conjunction with NanoSeptic).

Municipal Government Responses

Most municipalities, both in Canada and around the world, undertook similar actions to mitigate the impacts of the pandemic and to support both citizens and local businesses. These were largely in recognition of decreased vehicle traffic and increased demand for space for pedestrians and cyclists.

In some cases, these changes are permanent – typically where plans were in place and able to be accelerated. Many of these approaches were temporary, however, and were scaled back or removed entirely after being implemented in the summer months. At least in Canada, this appears to have been a seasonal decision in most cases: both due to snow clearing requirements and expected reduced active transportation usage during the winter months. At least one municipality (Calgary) has announced its intention to re-install newer, safer bike lane infrastructure in summer 2021.

Road or Lane Closures

Dubbed “adaptive roadways” by the City of Calgary, full or partial road closures have been among the most popular transportation-based responses to the COVID-19 pandemic in municipalities.

¹⁷ [Electric Autonomy Canada](#)

¹⁸ [CTV](#)

¹⁹ [McKinsey](#)

²⁰ [Lime](#)

This entailed closing roads to traffic, from one lane up to a full roadway. In some municipalities, this was limited to weekends. Closures were typically marked using temporary infrastructure such as pylons. Traffic-free lanes or roads were primarily intended to accommodate active transportation, and in some cases to allow for wider sidewalks.

Slow Streets

Many municipalities have introduced traffic calming measures, reduced speed limits and/or restricted vehicle access via removable barriers on selected streets. These “slow streets” are a way to accommodate and encourage active transportation. While all municipalities that were involved in this study used this measure, none embraced it more than the City of Halifax, which introduced over 60 km of slow streets in response to COVID-19.

Removal of On-Street Parking

Many municipalities removed on street parking in conjunction with one of the two previous measures. This measure was also undertaken as a way to widen sidewalks in central locations to accommodate social distancing among pedestrians; queueing for curbside pickups; and new or expanded restaurant patios. Some municipalities, including Halifax, added fifteen-minute loading zones for curbside pickups.

Expansion of Active Transportation Infrastructure

Some municipalities that had planned to create bike lanes accelerated those plans and created additional permanent active transportation infrastructure including bike lanes and pathways. Many others installed temporary, “pop-up” bike lanes to make active transportation a safer, more viable option during lockdown periods.

SECTION 2 – Transit Agency Impacts and Actions

Impacts of COVID-19 on Transit Ridership

When lockdowns were announced across Canada in March 2020, public transit ridership numbers experienced an immediate and drastic decline. By April, average transit ridership in Canadian cities had fallen by a staggering 85%. At that time, roughly 40% of Canadians had shifted to teleworking, while many others were laid off as a result of business shut-downs.²¹ The biggest shifts to teleworking occurred in cities that had the highest rates of public transit usage prior to the pandemic, such as Toronto and Montreal.

Declines in transit usage in Canada were largely consistent with those in other OECD countries, which experienced ridership declines in cities of anywhere from 60 to 95% during lockdowns.²² Figure 6, below, provides proxy transit ridership levels from a sample cross-section of Canadian municipalities, from prior to the pandemic and during the months that followed.

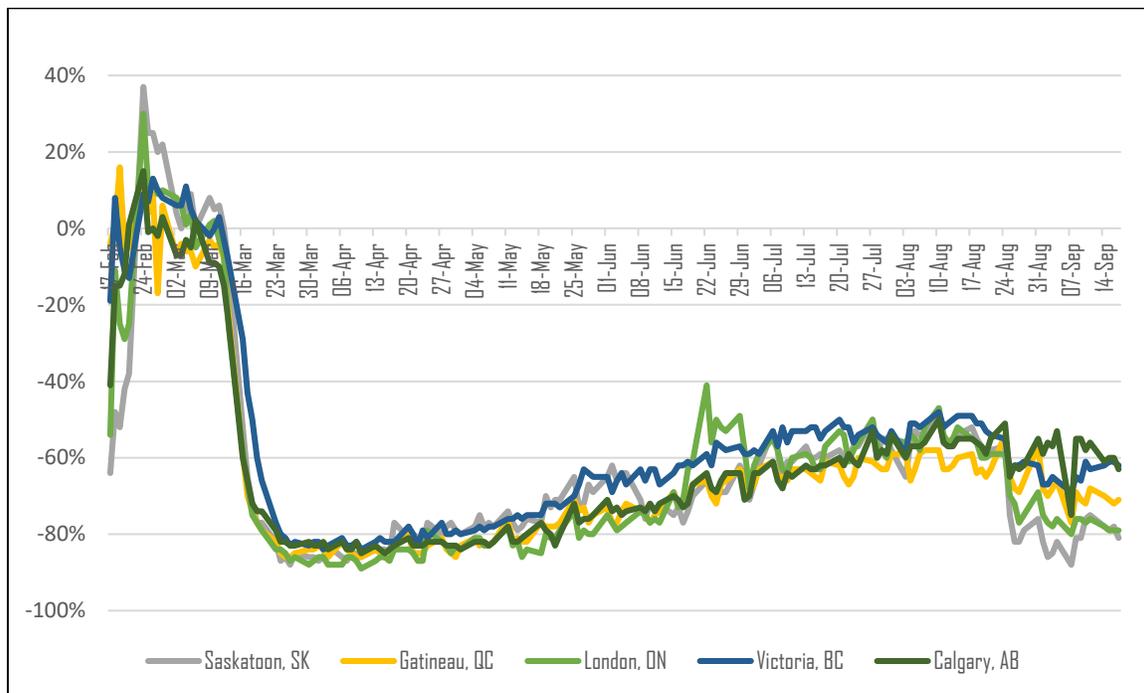


Figure 6: Proxy Transit Ridership Levels in Select Canadian Cities Prior to and Following the COVID-19 Outbreak²³

²¹ [Statistics Canada](#)

²² [Oliver Wyman](#)

²³ Data amalgamated from proxy transit ridership data made publicly available by Transit App (<https://transitapp.com/coronavirus>) and Google's COVID-19 Community Mobility Reports (<https://www.google.com/covid19/mobility/>).

The steepest declines in ridership were seen in non-bus modes, such as subways, light-rail transit, inter-city rail and ferries. Paratransit services generally experienced the lowest declines in ridership, as many users require this service to attend regular medical appointments and perform other essential tasks. By the fall of 2020, most agencies were reporting that ridership had returned to approximately 50% of pre-pandemic levels. This reflects the fact that roughly 50% of transit users in Canada are “choice riders” – those who have the option to use non-transit modes to commute, including teleworking or telestudying.

Demographic Disparities

While these transit ridership declines are widely recognized, what is less discussed are the demographics of those who continued to use transit throughout the lockdown and those who stopped. Transit App, a popular app that provides real-time transit vehicle location and scheduling data to residents of 26 of Canada’s biggest cities as well as many cities throughout the US and Europe, conducted a survey of 10,000 Canadian transit users in April. Survey findings, which also include 15,000 responses from the US, revealed stark demographic disparities among those who continued to use transit following lockdowns.²⁴ Some key findings from the survey, which are supported by other studies, are noted below.

- **Income level.** Prior to the outbreak, roughly 50% of commuters who used public transit earned more than \$50,000 annually. Following the lockdown, this percentage dropped to less than 25%. Approximately 40% of those who continued to use transit earned less than \$20,000 annually.
- **Car ownership and access.** Only 9% of those who continued to use transit owned a car, while an additional 6% stated they had access to a car when needed. A large majority of car owners who used transit to commute prior to the pandemic, known as “choice riders,” either switched modes or began teleworking following the lockdown.
- **Race.** The share of white riders among those who continued to use transit declined by almost 50%, while the share of black riders increased by slightly over 50%. Aside from whites, the only other racial group to experience a decline in ridership share was Asian Canadians/Americans.
- **Gender.** Prior to the pandemic, transit ridership in North America was roughly a 50-50 female-male split. Following the lockdown, the share of female riders grew significantly, to

²⁴ [Transit App](#)
Also see: [Transit App](#)

56% relative to only 40% for males (3% of respondents preferred not to indicate gender and 1% identified as non-binary).

- **Employment sector.** The four employment sectors that continued to rely on transit to the greatest degree were: healthcare, food and food services, sales/retail, and maintenance. This indicates that many low-income earners are in the “essential worker” category.

Prior to the pandemic, transit riders were drawn from a broad cross-section of society, across demographic lines. However, ridership data from the lockdown period reveals many underlying social inequities that must be explicitly addressed in future transportation system planning efforts. While the vast majority of commuters felt nervous about using transit, especially during the initial lockdown, some riders simply did not have any other options. Members of society who were exposed to the greatest amount of risk from COVID-19 were most likely to be low-income, female people of colour, without access to a private vehicle, who work to provide essential services.

Impacts of COVID-19 on Transit Agency Financials and Planning

In general, consultations with public transit stakeholders from across Canada revealed that transit agency decarbonization targets and green fleet procurement plans have not changed but have been delayed in some cases. Pilots and demonstrations of low-carbon transit vehicles have also seen delays in certain cases but overall are moving forward. The virus has made some transit agencies launch or begin to assess the potential benefits of transit-on-demand services, especially in under-serviced or low population density areas (see Section 3 for details). Some cities (e.g., Toronto, Halifax) have moved forward with the implementation of dedicated bus lanes during the pandemic and have stated that doing so was actually made easier due to lower levels of congestion and ridership. Further, several transit agencies stated that public pushback against changes to transit service and infrastructure were tempered by the pandemic, which helped to facilitate the rapid implementation of certain measures.

Revenue Decreases

In Canada, funding for transit agencies tends to come in two major buckets: capital funding and operating funding. Capital funding is primarily provided through provincial and federal grants, while operating funding tends to be derived from fare collection, municipal governments, and a variety of other revenue streams.²⁵

With the steep ridership declines witnessed throughout Canada, and in many cases the suspension of fare collection and enforcement, transit agency fare revenues were deeply impacted. Some

²⁵ [Canadian Urban transit Association](#)

experts have cautioned that without government intervention, transit agencies could enter into a “death spiral” whereby significant budget shortfalls could lead to permanent service reductions and the cancellation of modernization plans, which would subsequently lead to further declines in ridership and revenues.²⁶ Recognizing the essential nature of public transit systems, however, the Government of Canada launched several initiatives to support transit agencies until ridership returns to pre-pandemic levels.

Funding Support

Under the **Safe Restart Agreement** (SRA) the Government of Canada is supporting local efforts to maintain transit and other essential systems by contributing up to \$2 billion in emergency funding to municipal governments. These funds began rolling out in September 2020, and will continue to be available until mid-2021. Further, under the SRA, the Government of Canada will cost-match more than \$2.3 billion to support any additional provincial/territorial contributions for public transit.²⁷

In August of 2020, Infrastructure Canada launched the **COVID-19 Resilience** funding stream, which provides up to \$3.3 billion in funding to provinces and territories to support near-term infrastructure projects that will make communities more resilient in the face of the pandemic. Eligible projects include those related to transportation and public transit networks.²⁸ Municipalities have used this funding to support the implementation of many of the public transit best practices outlined in the following section, as well as other transportation initiatives such as those noted in Section 1. The emphasis of the program is on helping communities recover from the impacts of the virus in a manner that fosters low-carbon sustainability and improved human health. Funding for COVID-19 Resilience is being drawn from the Investing in Canada Infrastructure Program, which is investing \$30.2 billion to build new urban transit networks and service extensions. It covers up to 80% of project costs (up to 100% for territorial and Indigenous projects), and urban transit and active transportation projects are eligible.²⁹

In October of 2020, Infrastructure Canada announced \$10 billion in new infrastructure initiatives to bolster economic development and help make the country’s economy more resilient and sustainable. As part of the Canada Infrastructure Bank’s new **Growth Plan**, the federal government is allocating \$1.5 billion to accelerating the deployment of zero-emissions buses and charging infrastructure. This commitment will help to ensure that all Canadians can utilize low-carbon mobility options, and will further help to reduce the carbon intensity of public transit.³⁰

A common general sentiment from discussions with transit agencies was that they are still being insulated from the full impacts of the pandemic, and that the future of transit ridership is still

²⁶ [New York Times](#)

²⁷ [Government of Canada](#)

²⁸ [Infrastructure Canada](#)

²⁹ [Infrastructure Canada](#)

³⁰ [Canada Infrastructure Bank](#)

uncertain. It will take time to gauge the full scope of the impacts, and so partners such as higher levels of government need to stay focused and engaged on transit agency challenges until well after the pandemic itself begins to subside. It will be years, rather than months, before things return to normal, and all stakeholders should be providing near-term support with an eye towards long-term viability and sustainability.

Transit Agency Responses

In general, the response of transit agencies both within Canada and globally showed many similarities. This was in part a testament to the role that transit associations played in relaying best practices from medical experts to individual agencies. Several transit stakeholders that were consulted mentioned that the Canadian Urban Transit Association (CUTA) began hosting weekly meetings for senior transit agency staff soon after the outbreak, and shared useful and timely safety-related best practices during these meetings. CUTA's regularly scheduled monthly meetings were cited by some transit agencies as an important means of sharing up-to-date best practices on transit management from leading Canadian and global cities.

Countries with extensive contact tracing programs have linked less than 1% of all COVID-19 transmissions to public transit usage. Compared to other enclosed public settings such as workplaces, restaurants and bars, healthcare facilities, and gyms, benefits of public transit include the facts that riders tend to stay in vehicles for short periods of time and do not generally speak to other riders, which reduces the spread of airborne droplets. Risk of transmission is further reduced when proper safety measures are taken.³¹

Common measures taken by transit agencies to provide a safe travel option, especially for low-income frontline workers who have continued to rely on transit throughout the outbreak, are noted below.

- **Fare suspensions or touchless payments only.** First and foremost these steps were taken to increase the safety of passengers and operators by limiting inter-personal contact, touch points, and facilitating distancing. Some agencies suspended fares out of a recognition that mobility is a must in certain circumstances, whether that be for accessing medical care or other essential services, or getting essential workers to their workplaces. While this measure served to enhance rider and transit staff safety, it of course negatively impacted revenues from fares, the primary source of revenue for most transit agencies.
- **Reduced capacity on transit vehicles.** This step was primarily intended to facilitate social distancing on transit vehicles. It often involved using signage to restrict access to certain seats, and using decals on floors as guidance to standing passengers. To promote the safety of vehicle operators, seats adjacent to them were often marked as off-limits, physical

³¹ [Toronto Transit Commission](#)

barriers were installed around their seating areas, and rear-door boarding only rules were introduced in many cases. Rider occupancy was limited to a fixed number on certain vehicles, and when limits were reached, vehicles would typically skip stops and switch to “drop-off only” operations.

- **Real-time crowding data.** Some transit agencies provided real-time vehicle crowding data via apps or digital signage to inform riders of expected delays or potential safety risks due to over-crowding on vehicles.
- **Mandatory face coverings.** This step was implemented by transit agencies, typically starting between June and August, to reduce the chances of virus transmission on transit vehicles. Compliance rates were high in Canadian and global cities, but even low rates of non-compliance were cited as a major deterrent to increased transit ridership. Some cities and transit agencies began issuing fines to deter non-compliance.
- **Expanded cleaning and sanitation.** Most transit agencies increased the frequency of cleaning vehicle interiors, sometimes taking on additional staff to achieve this. Antimicrobial cleaning solutions were used for disinfection, with special attention paid to high-touch surfaces. Vancouver’s transit agency, TransLink, even piloted using copper on high-touch surfaces, due to its antimicrobial properties. This sometimes required that additional vehicles be brought into service to account for downtime related to frequent cleaning. Most agencies installed hand sanitizer and/or wipes on vehicles and in stations, and some even provided masks and other PPE to riders at no cost or through vending machines.
- **Ventilation enhancements and maintenance.** Well-functioning ventilation and HVAC systems on transit vehicles are an important component of reducing the chances for transmission. Air filters in ventilation systems are rated by minimum efficiency reporting value (MERV). Higher efficiency filters than those most commonly used are capable of trapping viruses, however these filters are harder to push air through which could necessitate extensive and costly upgrades to vehicles. Transit agencies are conducting studies on alternative measures such as using UV lighting to sterilize air as it passes through HVAC systems.
- **Service reductions.** Due to the rapid drop in ridership following the lockdown, many agencies reduced or suspended transit service on certain routes. In some cases, these reductions were motivated by declines in revenues as well as demand, which forced some transit agencies to temporarily lay off staff. In most cases, transit agencies attempted to maintain service levels in areas where demand remained relatively high, prioritizing these over areas frequented by office workers or students, who had predominantly shifted to teleworking and remote learning.
- **Communication and education.** The use of signage, ads, social media, apps and other tools to communicate public safety best practices and requirements to riders is an essential component of transit agency responses to the pandemic. Simple reminders to wear masks, socially distance and sanitize hands when in public are crucial. Communications can also

be used to introduce riders to newly adopted requirements such as vehicle occupancy limits, accepted forms of payment and boarding instructions.

In addition to safety measures and adapting to the pandemic, transit agencies in Canada have continued to deliver on pre-existing plans to expand and enhance the reliability of their services. For example, Halifax and Toronto both noted that low congestion levels made the process of installing dedicated bus lanes easier than it likely would have been otherwise. Calgary and other Canadian cities implemented transit-on-demand pilots primarily to respond to the virus, but they may become permanent if they continue to demonstrate success. In general, transit agencies found that certain types of projects were easier to forge ahead on, but this did little to reduce the scope and extent of challenges they faced in adapting to the pandemic.

SECTION 3 – Discussion and Recommendations

“Research has shown that disruptions can be a catalyst for shifts towards more sustainable transport behaviours but avoiding a return to pre-crisis behaviours requires governments to take decisive actions.”

- *International Energy Agency*

Changes in modal choice and transit usage that are likely to remain permanent

Teleworking

Global Workplace Analytics, a U.S.-based workplace consulting firm, estimates that 56% of the United States workforce has the capacity to telework. They estimate that following the pandemic (by the end of 2021), 25 to 30% of U.S. workers will work from home several days a week.³² Several factors contribute to this estimate:

- Increased demand for work-from-home from employees;
- Reduced fear about work-from-home among managers and executives;
- Increased pressure for work-from-home for disaster preparedness;
- Increased awareness of cost-saving opportunities in work-from-home; and,
- Increased awareness of the potential impact of work-from-home on sustainability.

In Canada, 39% of the workforce has the capacity to telework.³³ Based on the similar factors at play, and assuming that a similar pattern unfolds, it is estimated that about 20% of the Canadian workforce could continue to work from home several days a week. This estimate may be slightly high, given that only 22% of Canadian workers were working from home at the time of Statistics Canada’s survey in June 2020,³⁴ and many of these workers are likely to return to the office.

There are many emissions and transportation related trade-offs to teleworking which are currently being debated in academic and professional circles. Many of those who doubt that telework will offer net benefits to congestion and emissions contend that:

- A. People working from home will use their cars to run errands that they used to do on the way home from work; and,

³² [GWA](#)

³³ [Statistics Canada](#)

³⁴ [Statistics Canada](#)

- B. Home energy use will increase significantly while office space energy use will need to be maintained for part-time office work.³⁵

While point A is debatable, a key consideration is that at least people will have the option to run errands outside of peak congestion periods, when traffic will be light, and their trips will thus be more efficient. This is a core reason why the congestion and efficiency benefits of off-peak freight deliveries have been found to be significant. If the total number of vehicular trips cannot be reduced, one option is to spread them out over time so all vehicles can move more efficiently. Further, teleworkers might opt to conduct more of their errands locally and may be more inclined to use active transportation if that is the case. Point B assumes that people are turning their heat or air conditioning down each day when they go to work, which is again debatable.³⁶ Further, teleworking offers businesses the potential to downsize their office space, so energy usage, and thereby emissions from energy generation, could potentially be reduced through such actions.

Modal Selection

Transit numbers are down significantly and may not rebound to pre-pandemic levels in some areas, due to increased teleworking and concerns about social distancing. Non-shared transportation has become more appealing, and public surveys suggest that this trend could continue. This includes personal vehicles, active transportation including bikes, and shared mobility options. While the increased desire for personal vehicle ownership noted in Section 1 may drive a shift towards driving in urban areas, surveys have indicated that the rise in popularity of active transportation and micro-mobility during the lockdown is a trend that may persist once the pandemic subsides.³⁷

In June 2020, Oliver Wyman, a global management consulting firm, surveyed 4,600 people in nine countries to gauge their sentiment towards various modes of commuting in the wake of the pandemic. The results (summarized in the figure below) suggest that people will have a strong aversion to shared mobility modes for some time after the pandemic, and that active transportation and private vehicle use will become increasingly favoured. However, such a trend could quickly lead to increased congestion on urban roads and active transportation corridors, which could in turn help to drive commuters back into more efficient shared options like public transit.³⁸

³⁵ O'Brien, W. and F.Y. Aliabadi. (2020). Does telecommuting save energy? A critical review of quantitative studies and their research methods. *Energy and Buildings*, Vol. 225. Retrieved at:

<https://www.sciencedirect.com/science/article/abs/pii/S0378778820317710>

³⁶ [Natural Resources Canada](#)

³⁷ [McKinsey](#)

³⁸ [Oliver Wyman](#)

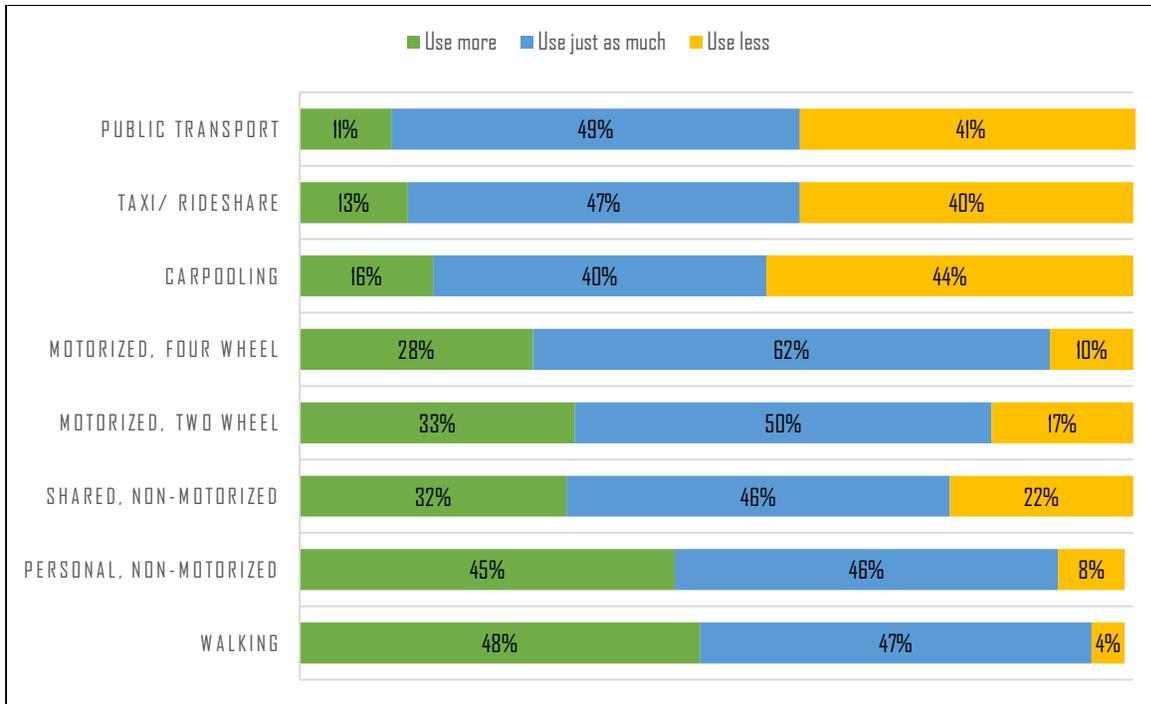


Figure 7: Responses from a global survey from June 2020 which posed the question: When the pandemic ends, which means of transport do you plan on using for your daily or weekly commute to your workplace or place of study within 2 hours of home?³⁹

After assessing the survey results, Oliver Wyman forecasted (in June) that transit usage rates would return to 80-90% of pre-pandemic levels by the end of 2020.⁴⁰ Actual numbers from Canada and other nations are closer to 50%. One takeaway from such observed and anticipated trends, is that unprecedented events such as the COVID-19 pandemic can lead to rapid shifts in human behaviour that are difficult to predict. In the case of public transit, it is important to remember why it became so popular in large cities in the first place, which was primarily due to cost, convenience and reliability.⁴¹ It is plausible that when the virus subsides such considerations will once again become prioritized by commuters.

Opportunities for Municipalities in Pursuing Low Carbon Mobility Actions

This section explores solutions that can be adopted in the short term by Canadian cities and transit agencies to leverage the unprecedented situation that the COVID-19 pandemic has created to permanently shift travellers into low-carbon modes and adopt travel behaviour that is safe, efficient and resilient. The focus is on actions that municipalities can lead with input, participation or support from other stakeholders. It emphasizes equity, diversity and inclusion in implementing

³⁹ [Oliver Wyman](#)

⁴⁰ [Oliver Wyman](#)

⁴¹ [Pollution Probe](#)

LCMAs in municipalities and presents actions in order of priority/desirability in decreasing emissions.

Discouraging Personal Vehicle Use

Opportunities for Low-Carbon Mobility Actions in Canadian Municipalities: Best Practices and Guidance recommended four broad types of low-carbon mobility actions (LCMAs): parking space removal, congestion charges, restricted road access, and low emission zones.⁴² Not only do these remain relevant in the context of the COVID-19 pandemic, some mechanisms pair well with changes that municipalities have implemented to manage pandemic-related needs and restrictions:

- Many parking spaces have been removed due to COVID-related adjustments to allow for social distancing among pedestrians, to provide additional space for active transportation such as cycling, to accommodate retail needs around curbside pickup, and to allow for new and expanded restaurant patios. The City of Montreal has even made public parking space removal a key element of its recently released Climate Plan.⁴³
- Municipalities across Canada either blocked or restricted access to certain roads to accommodate increased levels of active transportation.

Because these measures were implemented when vehicle traffic was lower than normal, there were less drivers affected, and the degree of the impacts (for example congestion and delays) were similarly reduced. Further, due to the overall level of disruption caused by the pandemic, there may have been more acceptance of change in general.

While these measures were overwhelmingly implemented on a temporary basis, municipalities now have the opportunity to permanently adopt at least a portion of them. They are likely to face less public objection if higher proportions of teleworking and active transportation persist, but in turn they are expected to yield increasing reductions in vehicle traffic by encouraging the use of public transit and active transportation.⁴⁴

Increasing Active Transportation and Micro-Mobility

The International Energy Agency has found that providing infrastructure that increases both safety and convenience is one of the best ways to increase uptake of active transportation such as cycling.⁴⁵ This was found to be particularly applicable to under-represented segments of the population, including women. This includes not only well delineated pathways that are separated from traffic, but also end-of-trip infrastructure such as parking for bicycles and micro-mobility

⁴² [Pollution Probe](#)

⁴³ [City of Montreal](#)

⁴⁴ [Pollution Probe](#)

⁴⁵ [IEA](#)

vehicles. The latter could have additional benefits, as bike parking infrastructure has been shown to result in up to five times higher retail spending than the same area of car parking.⁴⁶

Further, providing enhanced access to active transportation infrastructure can help cities deliver on human health objectives, as studies have found that the risk of premature death from all causes can be decreased by 28% among people who cycle three hours per week and by 22% among people who walk 29 minutes per day.⁴⁷ The benefits of active transportation are many, as it helps to address issues related to human health, climate change, congestion, air quality, quality of living, social equity, local economic development, access to amenities, etc. If urban Canadians are more willing than ever to engage in active transportation, cities should take advantage of this opportunity and provide world-class infrastructure to help keep this trend growing.

Actions to increase active transportation and micro-mobility should be paired with public awareness campaigns to increase uptake. Case studies suggest that campaigns including competitions, community actions and public commitments can increase their success.⁴⁸ In most cases, regulatory measures are required to allow micro-mobility companies to operate in municipalities. These sometimes require amendments at the provincial level, but can often be dealt with through municipal bylaw amendments.

Accelerating Electrification

A positive finding of this study is that Canadian cities are not cancelling or significantly altering climate and low-carbon mobility targets and programs as a result of the virus. Several prominent studies released in the wake of the outbreak have stressed that transportation-related air pollution (TRAP) is a major human health hazard, one that exacerbates the negative impacts of pre-existing conditions or viruses such as COVID-19. A paper released by Harvard University researchers in April found that an increase in ambient PM_{2.5} levels of only 1 microgram per cubic meter led to an increase in COVID-19 mortality rates of 8%. In their concluding points, the researchers noted: *“our results underscore the importance of continuing to enforce existing air pollution regulations to protect human health both during and after the COVID-19 crisis.”*⁴⁹ A team of University of Siena researchers arrived at similar findings, concluding that people living in areas with high levels of air pollutants are more prone to developing chronic respiratory conditions that make even young and healthy people more susceptible to serious complications and mortality from diseases such as COVID-19.⁵⁰ These points stress the importance of transportation

⁴⁶ [Niagara Knowledge Exchange](#)

⁴⁷ [Canadian Association of Physicians for the Environment](#)

⁴⁸ [IEA](#)

⁴⁹ Wu, X., et al. (2020). Exposure to air pollution and COVID-19 mortality in the United States: A nationwide cross-sectional study. *Science Advances*, Vol. 6, no. 45. Retrieved from: <https://advances.sciencemag.org/content/6/45/eabd4049>

⁵⁰ Conticini, E., Frediani, B., and Caro, D. (2020). Can atmospheric pollution be considered a co-factor in extremely high level of SARS-CoV-2 lethality in Northern Italy? *Environmental Pollution*, Vol. 261. Retrieved from: <https://www.sciencedirect.com/science/article/abs/pii/S0269749120320601>

decarbonization in enhancing human health and well-being, especially in cities. The virus could potentially lead to municipal and higher levels of government placing a greater emphasis on actions that have been proven to offer significant benefits to human health.

Related to human health benefits, and potentially compounding the negative impacts of TRAP, is the trend noted in Section 1 related to increases in private vehicle ownership observed in Canadian cities since the outbreak. If ICE vehicles are having significantly negative impacts on human health yet more and more urban Canadians are adopting them, municipal governments should be looking at ways to encourage their residents to adopt low-carbon vehicles. The City of Laval, Quebec is the only Canadian municipality that offers inhabitants a ZEV purchase rebate, which is currently up to \$2,000. This rebate is stackable with the provincial (up to \$8,000) and federal (up to \$5,000) rebates. This substantially improves the value proposition of ZEV ownership, and addresses a cost barrier that is otherwise insurmountable to many Canadians.

In addition to purchase rebates, cities can offer other incentives to ZEV ownership, such as:

- Free parking at municipal lots;
- EV-only parking spaces in priority areas;
- Access to HOV lanes;
- Access to roads that restrict access to certain types of vehicles; and,
- Exemptions from congestion charges or tolls.

Cities can also adopt policy measures that encourage ZEV ownership, such as:

- Right-to-charge legislation for multi-unit residential buildings (MURBs);
- Requiring EV charging station rough-ins in all new or renovated developments;
- Bylaw amendments to allow for on-street charging in neighbourhoods where residents do not have a dedicated parking spot on their property; and,
- Preferential tax treatment and/or parking discounts to ride-hailing, carshare and taxi fleets that commit to meeting certain ZEV adoption thresholds.

Cities can also play a role in providing more public EV charging infrastructure, especially in areas where there are gaps in private sector charging networks. Vancouver's commitment to ensuring that no one in the city is more than a 10-minute drive away from a DC fast charger is a great example of an innovative municipal EV charging infrastructure program.⁵¹

While ZEV adoption may do little to address congestion levels on city streets, it will help cities to achieve climate and human health goals. If the trend of increased private vehicle ownership in cities does persist, municipal governments can undertake steps to ensure that as many of those vehicles as possible are emissions-free.

⁵¹ [City of Vancouver](#)

Off-peak Deliveries

Following the outbreak, cities such as Toronto implemented off-peak delivery pilots by suspending noise bylaws in delivery zones adjacent to residential neighbourhoods. Toronto's primary motivation for its pilot was to ensure that trucking fleets could meet additional demands for key consumer goods. Following the initial lockdown in March, car traffic in Toronto rapidly declined by 60%, while freight truck traffic declined by only 25%. While car traffic remained at historic lows for many months, by July freight traffic had already rebounded to pre-pandemic levels.⁵² Such a comparison serves to illustrate the vital role of on-road freight in driving the economy and providing essential services, and justifies the steps taken by cities such as Toronto in prioritizing the delivery of goods.

A pre-pandemic pilot in the Region of Peel showed that off-peak deliveries reduced the number of freight trucks on the road during peak hours by 30%, reduced the average travel times of freight trucks by 18%, decreased GHG emissions and fuel consumption by 11%, and reduced air pollutant emissions by 11-18%. Further, businesses and authorities participating in the pilot did not receive a single noise complaint from local residents. By taking this simple and low-cost step, cities across Canada can serve to significantly and immediately reduce congestion levels, GHG and air pollutant emissions from transportation, and delivery times while enhancing the productivity of the freight and retail sectors and reducing their costs.⁵³ A leading academic researcher consulted for this study stated that preliminary data gathered during the lockdown indicated that while truck traffic did not decrease as a result of the pandemic, emissions from trucking were much lower due to reduced congestion. This researcher stated that the benefits of off-peak deliveries was one of the most important transportation lessons learned from the pandemic.

A wide range of transportation stakeholders from the public and private sector as well as civil society are encouraging governments across Canada to make off-peak deliveries a component of long-term strategies to reduce the carbon intensity of transportation. As of November 2020, the Province of Ontario was tabling legislation that would allow for off-peak deliveries in Ontario municipalities until at least September 2021.⁵⁴

⁵² [City of Toronto](#)

⁵³ [City of Toronto](#)

⁵⁴ [Province of Ontario](#)

Micro-Transit/ Transit on Demand

Municipalities in Canada have been piloting transit on demand (TOD) services for a number of years, and the number of active TOD pilots increased significantly during the pandemic.⁵⁵

TOD does not typically use fixed schedules or routes, but rather adapts vehicle movements to real-time rider demand. In some cases, it offers door-to-door service, and in others it services pre-existing transit stops within a given service area. It can utilize any type of vehicle, from full-size transit buses to shuttle buses, and even standard passenger cars and trucks. Municipalities typically chose vehicle types based on operating costs and passenger volumes. In some cases, ride-hailing providers such as Uber and Lyft provide TOD services and are subsidized by local transit agencies. TOD is well suited to smaller communities where demand for public transit is light or to communities of any size during off-peak hours. These services typically use an app as the interface with riders, and payments can be made through a variety of methods, including transit passes in some cases.⁵⁶ The TOD app used by several Canadian municipalities is Pantonium, which was developed by a Canadian start-up and uses real-time rider demand data to continually optimize transit vehicle routes.⁵⁷

TOD offers substantial benefits in terms of vehicle emissions, transit network operating costs, and reliability from a rider perspective. Rather than having a full-size transit bus in service at times or on routes with minimal demand, it tactically deploys transit vehicles only where and when they are needed.

Canadian cities currently providing TOD services include Calgary, Edmonton, Medicine Hat, and St. Albert, AB; Regina and Saskatoon, SK; and Barrie, Belleville, Chatham-Kent, Innisfil, Sault Ste. Marie, and Stratford, ON.

Addressing Inequities in Transportation Networks

While the opportunities presented in this section are prioritized based on GHG reduction potential, it is nonetheless important to consider opportunities that could help to address some

TOD Pilot in Belleville

Belleville, Ontario launched a TOD pilot in 2018 and has seen evening transit ridership increase by 300% while reducing the number of evening buses from 13 to 5 and reducing per-bus mileage by 30%.

When transit demand in Belleville plummeted during the COVID-19 lockdown, the city shifted its entire transit system to on-demand until ridership levels grew to the point where fixed routes and schedules were once again justified. The system also made it simple to ensure adequate distancing on transit vehicles, by allowing managers to limit the number of passengers in a vehicle at any given time.

⁵⁵ [Electric Autonomy](#)

⁵⁶ [City of Barrie](#)

⁵⁷ [The Intelligencer](#)

of the social inequities inherent in municipal transportation networks. After all, attempts to address complex environmental problems such as GHG emissions in isolation of complex social problems such as racial and financial inequity have in some cases served to prolong or exacerbate these types of systemic problems.

Findings based on transit ridership numbers, epicenters of outbreaks, essential worker demographics, and other metrics indicate that COVID-19 is largely a blue-collar disease. Following the outbreak, it was predominantly white-collar jobs that shifted to telework protocols. The people who held those positions were disproportionately white, male, and high-income earners. Most white-collar workers own or have access to a private vehicle, or have the means to acquire one. Although many such workers chose to commute via transit prior to the pandemic, these choice riders quickly abandoned shared mobility in favour of options that kept them isolated. Others, however, lacked such options, and were forced to continue to use affordable shared mobility to commute to hands-on, low-paying jobs, many of which were categorized as essential.

This stark reality suggests that cities should prioritize near-term actions that explicitly address mobility challenges faced by low-income, marginalized communities. Steps that could help to address these challenges include situating low-cost housing adjacent to suburban transit hubs to allow people living in areas where housing is affordable to easily commute to downtown cores where jobs tend to be plentiful. A related option is increasing affordable housing in downtown areas, either through new development projects or by allocating a minimum percentage of affordable units in downtown MURBs. Other options include prioritizing low-income neighbourhoods for expanded public transit services, new and well-connected active transportation infrastructure, and the deployment of low-carbon transit vehicles. Low-income neighbourhoods have long been impacted by disproportionately high levels of traffic-related air pollution (TRAP), as they are often located next to major highways or industrial areas.⁵⁸ It would therefore be prudent to prioritize such neighbourhoods for clean transportation initiatives and funding.

Another approach to addressing transportation inequity that may warrant consideration is following the lead of Kansas City and assessing options around making municipal bus services, or transit services in certain areas, free to use.⁵⁹ The city introduced free bus service after conducting a study looking at the total costs of implementing fare collection services and enforcement, as well as the net societal benefits that public transit offers. This study, conducted prior to the pandemic, determined that transportation is a fundamental enabler for people to contribute to the economy and perform critical work. It viewed free public transit as a force for equality, and municipal authorities agreed.

⁵⁸ [Smart Cities Dive](#)

⁵⁹ [Vox](#)

Portland, Oregon is frequently cited as a globally leading city on transportation justice and equity. Portland Bureau of Transportation's 2019-2022 Strategic Plan: Moving to Our Future,⁶⁰ states that one of its goals is to increase opportunities for the community to participate in developing policy and making decisions.⁶¹ A key element of the approach the Plan and Bureau takes is to ask two fundamental questions when beginning to assess the merits of any potential action:

- Will it advance equity and address structural racism?
- Will it reduce carbon emissions?

Such a framework could serve as a good starting point for cities seeking to engage more deeply in addressing transportation equity.

Going beyond the level of municipal governments, another option that could be explored to help address transportation inequity is allocating a certain amount of Investing in Canada Infrastructure Program funds explicitly to low-carbon actions that take place within low-income neighbourhoods.

While it is important for cities to continue to engage in actions that promote the adoption and use of ZEVs, municipal governments should consider targeting ZEV deployment programs specifically at low-income residents. Programs that should be considered to help address financial barriers to ZEV ownership include those that:

- Offer facilitated access to credit for ZEV purchases,
- Provide purchase rebates for used ZEVs,
- Introduce "right-to-charge" rules for MURBs, or
- Enact public charging hub requirements in low-income neighbourhoods.

It should be noted that challenges and opportunities related to transportation inequity were not a focus of this study, but that further research to address some of the issues touched upon here is not only warranted, but long overdue. Such research could be initiated by any level of government, in partnership with experts in civil society and the private sector, and directed by the lived experience of those who confront transportation inequities on a daily basis.

⁶⁰ [City of Portland](#)

⁶¹ [City of Portland](#)

Learning from Lyft's Resilient Cities Project

The popular ride-sharing and now also shared-mobility company Lyft was founded with the idea of making car ownership optional and transforming cities. Recognizing the importance of the built environment in cities, Lyft argues that we have to change how streets are designed to better utilize space for all types of vehicles, not just private cars. In response to a sharp decline in their ride-sharing business due to COVID-19, Lyft partnered with American transportation firm Sam Schwartz to create detailed visions for resilient neighbourhoods in New York, Chicago, Oakland and Washington, DC. This visioning project looked at how streets, services and indeed entire neighbourhoods could change to support reduced personal vehicle ownership and use.

Rather than examining the broad application of possible solutions, the project team began their analysis by looking at specific corridors in key markets and how many people were serviced by transit in these corridors. They projected how many people who used to take transit would likely stop using it or reduce their usage due to the pandemic, and then considered what it would take to shift as many of them as possible to sustainable modes such as active transportation or micro-mobility. Unsurprisingly, the answers varied depending on factors including transit ridership numbers and occupancy limits; distances between residential neighbourhoods and employment hubs; and demographic indicators such as vehicle ownership. Solutions identified included combinations of rapid transit, protected cycling and walking infrastructure, expanded bike sharing, and other complimentary sustainable mobility choices

One finding that applied to all cities and neighbourhoods examined was that **safer street design is key**.

Find out more about Lyft's Resilient Cities project [here](#).

Barriers and Challenges Faced by Municipalities

The most common barrier cited by municipal authorities during this study was budget shortfalls and lack of funding. This forced many municipalities to delay certain low-carbon mobility actions (LCMAs), as resources were diverted to public safety and maintaining critical infrastructure. Both active transportation and public transit are currently facing long term funding shortages. Although a great deal of emergency funding was delivered to municipalities during the pandemic, stakeholders stress the need for long-term, sustained funding streams to support LCMAs. Infrastructure Canada has signalled that funding will be made available to support active transportation and related projects in municipalities, and the Federation of Canadian

Municipalities (FCM) is seeking to create a dedicated active transportation fund through the Green Municipal Fund, which it administers. A challenge associated with active transportation spending is that it does not offer municipalities direct returns on their investments. This is especially true given that healthcare costs are primarily borne by provinces, who would reap tangible financial benefits from a healthier populace. Active transportation offers significant quality of life benefits, but that does not change the fact that from a budgetary perspective it represents a drain on municipal resources.

Several stakeholders consulted stressed the point that passenger vehicles are very inefficient users of space in urban settings. Their physical space requirements are substantial, and in urban settings in particular, that space has an incredible amount of value on multiple levels. Any time urban space is reclaimed for alternative uses, it offers a lot of value to a variety of stakeholder groups. Some of the reclamation that took place during the pandemic has the potential to be made permanent, however achieving this poses a wide range of challenges to municipal authorities. Given that teleworking is a trend that may last, and potentially even increase further in the future irrespective of the pandemic, it is possible that there will be reduced parking requirements for office spaces in cities. Identifying such opportunities and leveraging them to provide space for alternative modes of transport and other land uses should be prioritized by municipalities and approached from a systems-level, multi-stakeholder perspective.

The variety of micro-mobility options that are being explored across Canada offer the potential to provide solutions to certain mobility problems (e.g., “last-mile” travel), however they also pose challenges on a number of fronts. These include wireless infrastructure requirements, costs related to infrastructure development and ongoing maintenance (especially during winter months to maintain the viability of these services), and public safety (e.g., from abandoned or parked vehicles obstructing the movement of people and other vehicles). Further, one stakeholder consulted mentioned that micro-mobility usage is not particularly affordable in many cases, and so it only provides an option to travellers who can already afford and access a variety of other modes of transportation. Cold climates pose another challenge to micro-mobility options, however many pilots are currently being conducted in cities that experience long winters (e.g., Ottawa, Minneapolis, Boston) and results will help to inform further action in this area in Canada.

In general, seasonality was a barrier commonly cited by municipal officials. Many mobility-related actions which are feasible during summer months are made more difficult during Canadian winters due to snow, ice and cold. Winter weather necessitates additional infrastructure and maintenance to make certain actions feasible (especially those related to active transportation and micro-mobility), and this requires additional budget and staff. Active transportation usage was cited as being heavily reduced in winter months by all cities consulted for this study (even Vancouver). Several experts maintained that active transportation can remain viable during the winter if infrastructure is carefully and consistently maintained, however this requires additional budget and winter usage rates will be lower regardless of maintenance regimes.

Some stakeholders consulted stressed that unprecedented times like this require bold vision on the part of municipal planners. Developing the elements of such a vision is only one part of the challenge – another part is communicating that vision to the public in a manner that is easy to comprehend and resonates with them. Communications should focus on the benefits that alternative urban planning can offer to individuals and the broader community. Attaining buy-in on visions from not only members of the public but also local business associations that will be impacted by actions is critical. To reduce the risk of public pushback on the part of those adverse to change, alternative visions to business-as-usual need to be communicated in palpable and innovative ways. The use of visual multi-media was suggested as a useful means by which to show stakeholders what a given street or neighbourhood could look like if planners digressed from a business-as-usual approach (i.e., one that prioritizes privately-owned cars) to one in which multi-modality and multi-functionality were embraced. Once multi-stakeholder support for a given vision or action can be demonstrated, it will be easier for municipal authorities to get their visions approved and supported by City Councils.

Disruptive times can be catalysts for big ideas, as they force authorities to re-think aspects of society that are typically taken for granted or viewed as unalterable. Times like this can be optimal for assessing and planning for disruptive changes to transportation networks that are on the horizon (e.g., autonomous vehicles, vehicle-to-everything technologies, intelligent transportation systems). Municipal decision-makers need to question how future technological and behavioural disruptions can serve to make the lives of residents better, and then begin leveraging those benefits to push forward with near term actions.

A common barrier stated by municipal and transit agency officials alike is overcoming public resistance to return to urban transit. From a municipal perspective, it is vital that funding be allocated to not only maintaining transit operations, but to areas such as advertising campaigns to reinforce to the public that transit has not served as a significant source of virus transmission as long as basic precautions are taken (i.e., face coverings, distancing, and regular hand cleaning). In the end, it may simply be a matter of time once the virus subsides before ridership returns to pre-pandemic levels. A combination of factors such as a viable vaccine being made widely available, herd immunity beginning to take effect, congestion levels increasing, and car ownership costs in cities continuing to drain household finances may begin to catalyze a shift back to public transit. To allow this shift to occur however, transit operations, end-user costs and reliability must be maintained, and cities should avoid undertaking actions that make the use of passenger vehicles more convenient or less costly.

Barriers and Challenges Faced by Public Transit Agencies

A major challenge currently being confronted by transit agencies is restoring confidence in public transit, both among “choice riders” and those who continue to rely on transit as their primary mode of mobility. Some agencies consulted stated that it may take two years or more to restore

ridership to pre-pandemic levels. Another challenge has been reduced staffing capacity due in some cases to temporary layoffs, and in other cases to staff member efforts being diverted to COVID response and safety measures. A challenge cited by certain transit agencies was navigating the red tape preventing them from rapidly implementing enhanced safety measures such as the installation of barriers around vehicle operators or hand sanitizer dispensers on vehicles.

One transit agency consulted mentioned difficulties faced with enacting 2 metre distancing rules on transit vehicles, which, in the case of buses, would see the number of riders limited to 8 or 10. To address this, the agency reached out to its provincial health authority and had it relax distancing limits on transit vehicles. To compensate for the lack of 2 metre distancing it agreed to make masks mandatory on all vehicles and to install barriers around vehicle operators.

During the most drastic declines in ridership, most major Canadian transit agencies were incurring millions of dollars in losses on a weekly basis. All of the transit stakeholders we spoke to mentioned that financial support from higher levels of government is critical, especially to maintain service levels to allow for social distancing on vehicles, maintain public confidence in transit networks, and to continue to deliver on low-carbon vehicle procurement and implementation.

Canada's biggest transit agency, the Toronto Transit Commission (TTC), is estimating a 2020 budget shortfall of \$590 million. However, the Government of Canada's Safe Restart Agreement has significantly helped to address this, in part by providing the TTC with over \$400 million to address losses sustained between April and September 2020. Additional SRA funds will be made available to transit agencies in March 2021, and emergency funding can be sought subsequent to that on a needs basis.⁶² While transit agency support for funding through the SRA is uniformly high, some stakeholders consulted stressed that sustainable, long-term support was needed to recover from the impacts of the pandemic while continuing to expand service offerings and engage in low-carbon initiatives and programs.

While all transit agencies consulted stated that they required both emergency and long-term funding from higher levels of government, agencies such as Halifax Transit derive a significant portion of their funding from local residential property tax revenues. Such funding streams were largely uninterrupted during the pandemic and provided certain agencies with a consistent revenue stream throughout 2020. Diversified sources of funding served to make transit agency financials more resilient during the pandemic, and should be further explored by transit agencies in the future.

In addition to financial support, some experts consulted stated that higher levels of government can be supportive through the provision of educational resources in areas such as:

- Best practices in transit safety measures;

⁶² [Toronto Transit Commission](#)

- Technical specifications and knowledge related to factors such as the role of ventilation and filtration systems in the dispersal and mitigation of airborne particles (it was generally agreed that individual agencies should not have to commission studies in this area, especially considering that most transit agencies across Canada use similar vehicles);
- Restoring public confidence in public transit;
- Quantifying the exposure and transmission risks associated with public transit (especially considering that there are few cases globally of transit serving as a significant source of transmission); and,
- Potential steps to make transit safer, more reliable, and more accessible to those who lack alternative mobility options.

Concluding Thoughts

Remedial actions taken by cities throughout Canada and globally in response to the virus were largely consistent, indicating that municipal governments were following the advice of medical experts and tracking best practices in real time. A positive finding of this study is that cities in Canada and globally are not cancelling transportation decarbonization plans and targets as a result of the virus. However, funding is a major issue, and has led to certain actions being delayed.

Impacts on urban transit systems and actions taken in response were also largely consistent around the globe and throughout Canada. This aligned response was facilitated in large part by the dissemination of information through pre-existing networks such as transit associations.

Findings based on transit ridership numbers, epicenters of outbreaks, and other metrics indicate that COVID-19 is largely a blue-collar disease. This suggests that cities should prioritize near-term actions that explicitly address challenges faced by frontline workers, especially those in low-income, marginalized communities. Further research on this topic is required, however opportunities for cities to explore might include:

- Prioritizing low-income neighbourhoods for expanded public transit services, new active transportation infrastructure, and the deployment of low-carbon transit vehicles;
- Allocating a certain amount of Investing in Canada Infrastructure Program funds explicitly to actions within low-income neighbourhoods; and,
- Launching programs to address financial barriers to ZEV ownership, such as facilitated access to credit for ZEV purchases, "right-to-charge" or public charging hub requirements, and purchase rebates for used ZEVs.

Throughout the lockdown period, cities have been prioritizing and expediting actions to make active transportation a safe, reliable and accessible option. This shift not only benefits transportation network emissions, but also human health and quality of life. Active transportation use greatly increased in popularity during the pandemic, though experts are not certain if this trend will last. To help it last, cities can install permanent infrastructure and ensure it is well maintained throughout the year to drive as much traffic as possible to this mode of transport, which offers the greatest benefits of all modes from environmental and human health perspectives.

Early signs indicate that private vehicle ownership levels have increased in cities during the lockdown, and that people are opting to use their private vehicles as opposed to shared modes such as public transit. There is uncertainty as to whether this trend will persist. Regardless of if it does or not, cities should continue to encourage ZEV ownership among residents by providing perks, incentives, information, and charging infrastructure. Increasing congestion levels and high costs of vehicle ownership in cities, which drove many people to favour public transit prior to the pandemic, may increase to the point where the masses return to transit once a viable vaccine is made widely available. To help facilitate this return, cities, transit agencies and higher levels of

government can engage in communications campaigns that stress the relative safety of transit use, so long as basic precautionary measures are followed. They can also explore making certain precautionary measures initiated during the pandemic permanent, to help restore the public's confidence in the safety of transit. It is important to note that to help facilitate a return to transit, transit operations, end-user costs and reliability must be maintained, and cities should avoid undertaking actions that make the use of passenger vehicles more convenient or less costly.

Teleworking presents major opportunities and major uncertainties for urban planners and transportation managers. It is a trend that is likely to persist once the virus subsides. It presents a wide range of possible pros and cons, and it is critical that these are understood by cities and explicitly addressed in municipal planning and decision-making. Further research is required to better understand circumstances under which teleworking offers net environmental benefits, and those under which it does not. Input from experts consulted for this study indicates that net environmental benefits are likely in most scenarios, but the many variables at play must be situated within the overarching variable of human behaviour to determine if this is indeed the case.

Appendix A: Municipal Best Practices – Updates on Cities Profiled in *Opportunities for Low-Carbon Mobility Actions in Canadian Municipalities: Best Practices and Guidance*

TORONTO, CANADA

Every five years, the City of Toronto surveys 5% of its households to gather data on travel patterns. The most recent of these surveys, known as the Transportation Tomorrow Surveys (TTS), was conducted in 2016 and reflects travel patterns at that time. The 2016 survey indicates that 57% of trips in the Greater Toronto Area are made using passenger vehicles (either as drivers or passengers), 28% are made using transit, and 13% are completed by walking or cycling.⁶³ As in other major cities, modal choices in Toronto are heavily dependent on proximity to the downtown core, with households in or near this area opting for transit and active transportation much more than suburban households.

Shortly after the initial COVID lockdown in March 2020, transit ridership levels fell by roughly 86% in the Greater Toronto Area (GTA). By June, ridership numbers began to increase slightly, but were still down by roughly 80%. Modes most affected were subways and streetcars going to the downtown core, while bus ridership did not experience the same level of declines. As of late October 2020, ridership levels on buses were back up to 50%, but overall ridership was down by approximately 60%.⁶⁴ The Toronto Transit Commission (TTC) anticipates that ridership levels will hover around 45% of pre-pandemic levels throughout the fall of 2020. Despite the decline in riders, it has only decreased service levels by 8% as of September, compared to a pre-COVID baseline.⁶⁵

With the back to school season starting in September, the TTC prioritized service on routes that lead to secondary schools.⁶⁶ During the summer, it also took advantage of reduced traffic levels to expedite the establishment of Toronto's first priority bus lanes on routes prone to transit overcrowding, beginning with the highly-trafficked Eglinton East corridor. The lanes will also be accessible to cyclists. They will not impact roadside parking, and passenger vehicle drivers will only be able to enter them while making right turns. The first of these priority bus lanes opened in November 2020.⁶⁷

⁶³ [University of Toronto](#)

⁶⁴ [Toronto Transit Commission](#)

⁶⁵ [Toronto Transit Commission](#)

⁶⁶ [Toronto Transit Commission](#)

⁶⁷ [Toronto Transit Commission](#)

The TTC is estimating a net 2020 budget shortfall of \$590 million, primarily due to fare revenue losses but also to additional expenditures required to deal with the virus safely (roughly \$40 million). The *Safe Restart Agreement* undertaken jointly by federal and provincial governments will provide the TTC with \$404 million for losses sustained in the April to September period. Additional funding under the Agreement will be made available in March 2021. Subsequent to March 2021, the TTC will seek emergency funding from federal and provincial governments on a needs basis.⁶⁸

With regard to efforts to control the spread of the virus, the TTC made face coverings mandatory in all transit vehicles and stations in early July 2020. Masks were provided at no cost to customers at high-traffic locations throughout the summer, and as of October, the TTC has made masks and other PPE available in vending machines. It has also committed to the use of higher efficiency air filters in vehicle HVAC systems, and is exploring the effectiveness of anti-viral filters, ultraviolet light, and photocatalytic oxidation. It has engaged an engineering consulting firm to conduct a vehicle airflow study to determine the impacts of factors such as open versus closed windows and doors, with results expected in fall 2020.⁶⁹

To help address the financial hardships experienced by individuals and small businesses, the TTC provided credits to customers that had already purchased transit passes for March and April of 2020. As a major real estate holder in the GTA, it also provided rent relief and term extensions to retail tenants on TTC property.⁷⁰

Facilitating safe and reliable public transit has just been one component of Toronto's response to the pandemic. Other transportation-related measures taken by the city included:

- The **CurbTO** program, which facilitates the curbside pickup of food and other goods in collaboration with local businesses. This includes the establishment of curbside pedestrian zones, temporary parking pick-up zones, and sidewalk widening in commercial areas.⁷¹
- The **ActiveTO** program, which consists of three major initiatives.⁷² "Quiet Streets" limits vehicle traffic to local traffic only and uses physical barriers and signs to provide additional space for pedestrians and cyclists while limiting the speed of motor vehicles.⁷³ The city also closed several major roads to vehicle traffic on weekends throughout the summer to provide residents with safe and spacious areas for active transportation, which were also linked to popular trails and destinations.⁷⁴ Lastly, ActiveTO also saw

⁶⁸ [Toronto Transit Commission](#)

⁶⁹ [Toronto Transit Commission](#)

⁷⁰ [Toronto Transit Commission](#)

⁷¹ [City of Toronto](#)

⁷² [City of Toronto](#)

⁷³ [City of Toronto](#)

⁷⁴ [City of Toronto](#)

Toronto extend its dedicated, permanent cycling network on busy transit routes by roughly 40 km, in most cases utilizing physical barriers and enhanced signage.⁷⁵

- The **CaféTO** program saw the city allocate additional space on sidewalks and roads to allow for expanded restaurant patios and enhanced social distancing. This initiative recognized that local restaurants were hit particularly hard by the pandemic, given that indoor dining was not permitted throughout the summer lockdown period.⁷⁶
- Recognizing the critical importance of **freight movement**, Toronto rapidly addressed challenges faced by the freight sector with several targeted initiatives. To ensure the delivery of goods could be achieved with optimal flexibility, it suspended a noise bylaw and began to allow off-peak deliveries throughout the city. It also began tracking truck volumes associated with goods movement to ensure that goods were getting where they needed to be without avoidable interruptions. Lastly, it initiated an electric-cargo bike pilot to help respond to the rapid rise in e-commerce experienced following the outbreak. Toronto is working to maintain momentum achieved on each of these initiatives, and is exploring making some of these changes permanent.⁷⁷

LONDON, UK

The original LCMA report highlighted that London was one of the most ambitious and innovative cities globally with regard to providing and incentivizing alternatives to passenger ICE vehicle usage. In late March of 2020, London suspended its congestion charge for motor vehicles, which covers most of its downtown core, to ensure that essential workers could move around the city in whatever mode of transport was most convenient for them. It also lifted restrictions on its Ultra-Low Emission Zone (ULEZ) and Low Emission Zone (LEZ). This occurred during the lockdown, which saw a large proportion of London's population either working from home or temporarily laid off.⁷⁸

As lockdown restrictions began to ease in mid-May, the City reinstated its congestion charge, ULEZ, and LEZ to ensure that increasing traffic levels did not lead to congestion. At this time, the City introduced congestion charge reimbursements to a range of essential workers including healthcare practitioners and municipal government staff.⁷⁹

In June of 2020, London announced a temporary increase to its congestion charge (from roughly \$20 CAD per day to roughly \$26). This was to ensure that vehicle congestion did not impede recovery efforts or low-carbon modes of transport. This change was made after official estimates

⁷⁵ [City of Toronto](#)

⁷⁶ [City of Toronto](#)

⁷⁷ [City of Toronto](#)

⁷⁸ [Transport for London](#)

⁷⁹ [Greater London Authority](#)

found that, as the lockdown was eased, the number of passenger vehicles on the city's roads could double as a result of citizens' reluctance to use public transit.⁸⁰ Further, it was determined that more space was needed to accommodate increased levels of active transportation. The increased charge was projected to decrease car trips in central London by half, and reduce transportation-related air pollutant emissions by 11%.⁸¹ At the time of finalizing this report, no results on the efficacy of the increased charge in reducing congestion and vehicle emissions had been released.

In addition to measures undertaken by the City of London, the Government of the UK implemented some innovative emergency measures to help its populace navigate pandemic-related mobility challenges. It committed roughly \$3.4 billion (CAD) in May 2020 to expand active transportation and micro-mobility infrastructure in municipalities. This was done in large part to relieve pressure on public transit systems to avoid overcrowding. Infrastructure being funded included dedicated bike lanes, widened sidewalks, safer intersections, and bus-only lanes on high-traffic streets. These actions were intended to help provide residents with safe and healthy modes of low-carbon travel and to enhance the long-term resilience of shared mobility once the pandemic subsides.⁸² The UK government also launched a bike repair voucher program, which provides up to £50 (roughly \$85 CAD) to individuals to encourage them to make sure their bikes are in good working condition. The first round of the voucher program was quickly over-subscribed and bicycle repair shops across the nation recorded record levels of business leading to long wait times for customers.⁸³

The UK will try to maintain momentum on active transport usage following the pandemic. It has reported that "millions" of its residents have rediscovered cycling during the outbreak. It is still aiming to double active transportation utilization between 2017 and 2025, in line with the targets set out in its Cycling and Walking Investment Strategy, which will be updated in late 2020.⁸⁴ The UK also committed over \$150 million (CAD) to e-scooter and drone delivery of medical supplies demonstrations in major cities. These efforts are aimed at utilizing low-carbon transportation modes to take pressure off public transit and provide an alternative to passenger vehicle travel. These demonstrations have been dubbed "Future Transport Zones" and are projected to catalyze clean tech innovation across the UK. The program will also provide investments for multi-modal mobility hubs that integrate, simplify and encourage the use of multiple forms of shared mobility such as public transit, bikes, car sharing and EVs.⁸⁵

⁸⁰ [Greater London Authority](#)

⁸¹ [Transport for London](#)

⁸² [Government of United Kingdom](#)

⁸³ [Government of United Kingdom](#)

⁸⁴ [Department for Transport](#)

⁸⁵ [Government of United Kingdom](#)

PARIS, FRANCE

At the end of April 2020, as Paris was planning to ease its initial COVID-19 lockdown, Mayor Anne Hidalgo stated that a return to a city dominated by cars was “out of the question.” She further stated that increased air pollution levels could exacerbate the health crisis (a claim supported by preliminary academic research conducted during the outbreak by Harvard University and the University of Siena). The Mayor also stressed that COVID would not lead to Paris altering previously announced programs and targets around low-carbon mobility.⁸⁶

On public transit, Paris’ priority during the pandemic was to make sure that transit vehicles did not become overloaded and allowed for social distancing. The city restricted access to public transit during peak morning and evening times to those required to work standard business hours in shared workplaces.⁸⁷ Those who were able to work from home were encouraged to continue doing so, bus service was expanded, and additional space for bike lanes and pedestrians was created.

In April, the Paris region announced that it would be investing over \$460 million (CAD) on an expanded bicycle lane network. The network, known as the RER Vélo, will connect downtown Paris with nine regional hubs via continuous, dedicated, bi-directional bicycle lanes spanning a combined total of 680 km.^{88,89} The expansions are scheduled to be completed by 2025, but in the short term, four temporary bicycle routes were created to help relieve pressure on highly trafficked public transit corridors.

Roughly 400,000 Parisians use the bicycle network to commute to work on a daily basis. However, the region is targeting over 2 million daily trips by bicycle by 2021. The expanded network is anticipated to be particularly helpful in facilitating longer distance trips by bicycles, for example those to and from Parisian suburbs. Complementing the expanded network is the region’s highly successful bike sharing program, Véligo, and its municipal purchase rebate for e-bikes (for roughly \$800 CAD), which has led to a surge in e-bike adoption.^{90,91}

After experiencing dramatic decreases in air pollutant levels in March of 2020 (e.g., NOx levels fell by roughly 70%), early indicators suggest that most Parisians would be willing to make lifestyle changes to keep their air clean. Transport & Environment, a leading European environmental NGO, surveyed French residents from Paris and other major cities following the lockdown to gauge how they felt about emergency transportation measures, air pollution, and related issues. Results

⁸⁶ [Bloomberg CityLab](#)

⁸⁷ [The Local](#)

⁸⁸ [Ile-de-France Regional Council](#)

⁸⁹ [RER V](#)

⁹⁰ [Ile-de-France Regional Council](#)

⁹¹ [Ile-de-France Regional Council](#)

showed that 74% of residents think more urban space should be designated for pedestrians, 66% think more space should be allocated to bicycles and transit, and over 70% support low emission zones which restrict access to high emitting vehicles.⁹²

SINGAPORE, REPUBLIC OF SINGAPORE

Following the spring 2020 lockdown, the number of daily trips by car in Singapore was reduced from approximately 10 million to 4 million. The city suspended its congestion charge to allow the free movement of essential workers. Bicycle ownership increased significantly, as did bike share memberships. When the first wave of the pandemic began to ease in July, however, car traffic levels increased significantly and Singapore reinstated its congestion charge.⁹³

Although Singapore's public transit network reported zero cases of transmission on its vehicles or in its stations, and significantly ramped up sanitation protocols, the public perception that privately owned cars provided the safest mode of mobility became strong. In Singapore, cars were previously viewed as luxury items and status symbols. Because the city-state is so small, spanning roughly 50 km across, real estate is at a premium and decision-makers have tried to shift residents to shared mobility in large part to save space – road infrastructure alone in Singapore takes up about as much space as housing. As such, cars are taxed heavily and generally cost five or six times more to purchase than in neighbouring jurisdictions. However, the pandemic poses a risk that the perception of car ownership will shift from being a luxury to a necessity. Singapore was already struggling with the problem of increasing private car ownership in recent years.⁹⁴

Measures taken in addition to the expansive congestion charge program have included significant enhancements to active transportation infrastructure (including covered pedestrian pathways to make walking more comfortable), increased car purchase taxes, introducing a 0% private vehicle growth rate (new vehicles can only be registered when an equal number of existing vehicles are de-registered), and even building an entire district with roads for motor vehicles located exclusively underground.⁹⁵ COVID-19 and the trends in private vehicle use that it catalyzed risks jeopardizing the successes achieved by programs aimed at discouraging vehicle ownership. A key factor that might help to quell the demand for private vehicles, however, are the growing trends of e-commerce and teleworking.

⁹² [Transport and Environment](#)

⁹³ [Channel News Asia](#)

⁹⁴ [Channel News Asia](#)

⁹⁵ [Channel News Asia](#)

NEW YORK CITY, USA

NYC was one of the first epicenters of the virus in the US in March and April of 2020. At that time, transit ridership plummeted by over 90%. As would be expected, NYC's Metropolitan Transportation Authority (MTA) began sustaining heavy financial losses. Consequently, it made the decision to suspend its \$70 billion (CAD) modernization plan, which would have facilitated critical upgrades to various components of its aging transit network.⁹⁶

In late March, NYC cut all subway service by 25% due to staff shortages and reduced demand. It also temporarily cancelled its Access-A-Ride program, which provides door-to-door service via shuttle buses for transit users with disabilities or serious health conditions. It reduced its express bus services and suspended bus service on routes with particularly low ridership levels. Overall, bus service was reduced to 75% of pre-COVID levels due to reduced ridership. Fare collection requirements were reduced to limit in-person interaction, and bus riders were required to board by rear doors only, to limit contact with vehicle operators. The MTA monitored passengers on buses and subways to ensure social distancing requirements were followed.⁹⁷ It also suspended 24-hour subway and bus services to allow for increased disinfection of transit vehicles between the hours of 1 and 5 am.⁹⁸

In mid-April, face coverings became required on all transit vehicles in New York State as per an executive order from the Governor.⁹⁹ By early August, when ridership levels began to increase, face coverings were also made mandatory for those waiting at transit stops and stations. MTA staff and volunteers distributed free masks at transit hubs, and non-compliant passengers would be refused service and escorted off vehicles if necessary. At that time, face covering compliance rates were estimated to be 90%.¹⁰⁰ Despite the high compliance rate, which is consistent with figures from major cities around the world, the fact that some riders chose not to wear masks has been consistently cited as a means of discouraging a rebound in ridership levels.

As of November, 2020, the MTA was facing a significant budget shortfall, and was waiting for the federal government to approve a bailout package worth more than \$15 billion (CAD) to ensure operations could continue smoothly. At that time, subway ridership was still down 70% from pre-pandemic levels. Without a government bailout, the MTA would be forced to consider cutting services by 40% and laying off staff.¹⁰¹ If this were to happen, estimates suggest the NYC region's GDP could be reduced by \$85 billion annually.¹⁰² While direct stimulus funding was being sought

⁹⁶ [New York Times](#)

⁹⁷ [NBC New York](#)

⁹⁸ [CNBC](#)

⁹⁹ [New York Post](#)

¹⁰⁰ [Spectrum News](#)

¹⁰¹ [Spectrum News](#)

¹⁰² [Bloomberg](#)

from the federal government, the state government was also exploring ways to help transit in NYC, possibly through increases in state sales and/or gas taxes (roughly 37% of all state gasoline tax revenues are currently allocated to public transit¹⁰³). Funding from higher levels of government were seen as the best means by which to avoid fare increases, service reductions and layoffs.¹⁰⁴

¹⁰³ [Empire Center](#)

¹⁰⁴ [Spectrum News](#)