



## **Case Study Series**

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# **Multi-modal transportation: Making the link between climate action and road safety**

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# Multi-modal transportation: Making the link between climate action and road safety

*Parachute Vision Zero creates case studies that feature a variety of issues and examples of Vision Zero from across Canada and around the world. We hope these practical, evidence-based case studies will help educate, inform and inspire those who are interested in road safety and getting to zero. We share when we publish new case studies through our e-newsletter, **Word on the Street**.*

## Background on climate change, greenhouse gas emissions and road transportation

Climate change, as a result of greenhouse gas (GHG) emissions from human activities, is a global threat already being experienced in regions across Canada. Coastal communities in both Eastern and Western Canada are experiencing extreme weather events such as flooding, severe storms and rising sea levels. Central provinces such as Ontario and Quebec are experiencing warmer climates and heat-related illnesses and, in the drylands of the Prairies, agricultural systems are particularly vulnerable to changing weather patterns such as irregular precipitation<sup>1</sup>. All these events have far-reaching impacts on the health, safety and economic wellbeing of Canadian residents, particularly those in marginalized populations. Left unchecked, climate change, and activities causing increased GHG emissions, will continue to threaten the lives and livelihoods of Canadians at increasingly catastrophic and alarming rates.

In response to this threat, there have been varying levels of climate action and advocacy from local activist groups aimed at sectors of governments to reduce GHG emissions in Canada from its various sources, including road transportation. Globally, one of the primary sources of GHG emissions is transportation, which accounts for 15 per cent of global emissions<sup>2</sup>. In Canada, transportation is one of the biggest contributors of GHG emissions, contributing 25 per cent of all emissions<sup>3</sup>. Of these emissions, passenger road transportation contributes nearly half<sup>4</sup> and largely comes from urban centres. Being one

of the greatest sources of GHG emissions in Canada, there is an urgent need for collective action to reduce road-transportation-related GHG emissions. Climate activists and researchers have long advocated for various mitigation methods that are currently being explored in different capacities. These include:

- Municipal transportation systems that shift toward multi-modal transportation (MMT) that prioritizes active transportation (e.g., walking, cycling, rollerblading, skateboarding); public transit; and auto sharing to reduce solo car rides;
- Policies to increase the share of zero-emission or fuel-efficient vehicles sold in Canada;<sup>5</sup>
- Policies to reduce the carbon intensity of the existing fleet of vehicles, including light and heavy freight through lower-carbon fuels.<sup>5,6</sup>

Of these methods to reduce GHG emissions from road transportation, multi-modal transportation (MMT) is of particular interest due to its shared goals and benefits not just for climate action, but also for public health, the local economy and, unsurprisingly, road safety. As advocates push for MMT and there are increased numbers of pedestrians and cyclists on the road, it's important to consider the implications these systems also have for the road safety of vulnerable road users. Vulnerable road users, such as pedestrians, cyclists and persons with disabilities, face higher risks for road traffic injuries than other road users in urban settings<sup>7,8</sup>, especially in the absence of proper safe mobility strategies and infrastructure. In alignment with goals of both Vision Zero and Complete Streets, MMT systems need to be built to be safe and prevent serious road injury and fatalities for everyone, including those who walk, cycle, take transit and drive, as well as people of all ages and abilities. Road safety and multi-modal transportation planning must go hand in hand.

Despite promising new strategies and technologies to combat the rise in GHG emissions as well as commitments made by nations most recently in the Paris Accord, Canada is below its climate targets for 2020 and the Canadian transportation sector actually increased its GHG emissions by 27 per cent from 2000 to 2018<sup>4</sup>. It is now more urgent than ever to push for strategies such as MMT systems to reduce GHG emissions. As with any complex issue, a single strategy is unlikely to achieve climate targets for transportation-related GHG emissions reductions, so multi-sectoral approaches that address the various sources of emissions are necessary to tackle this complex and pressing issue.

## Purpose of this case study

This case study will focus on multi-modal transportation and its unique link between climate action and road safety, primarily considering urban settings.

The purpose of this case study will be to understand how MMT can be a vital tool for meeting both GHG emissions reduction and Vision Zero goals and make the case for jurisdictions to consider this intersection in their road safety planning.

To explore the relationship of climate change and Vision Zero through the lens of MMT, two experts in the field were interviewed:

- **Victor Ngo:** Research Associate with the School of Population and Public Health at the University of British Columbia and Transportation Planner at WATT Consulting Group. Victor was part of a study of the Comox-Helmcken Greenway in Vancouver, which provides some of the first direct evidence that promoting MMT through urban greenways can reduce neighbourhood greenhouse gas emissions.
- **Jessica Lamarre:** Director of Traffic Safety at the City of Edmonton. Jessica has been part of leading the development of the new Safe Mobility Strategy, developed in 2020 with the purpose of achieving Vision Zero through safe and livable streets in Edmonton.

Throughout this study, the thoughts and experiences of these two experts will be referenced. Full interview responses can be found in the Appendix.

## Multi-modal transportation and climate action

### *Defining multi-modal transportation*

Multi-modal transportation (MMT), as the term implies, is a system that uses multiple mechanisms of transportation to move people and things around.

According to Victor Ngo, in the context of road transportation, “a multi-modal transportation system creates a safe, convenient and comfortable environment that provides choice for people in how they want to move around in a community, whether

by walking, cycling, rolling, transit or driving. This perspective is one of the fundamental principles driving the Complete Streets movement. Creating a successful multi-modal transportation system will mean prioritizing *people* instead of automobiles when making decisions about the type of investments we make and how we allocate space in our communities.”

As highlighted by Ngo, the emphasis of MMT is to prioritize people and their transportation needs to give them relevant, accessible and safe options for getting around. Conventional transportation planning favours personal vehicle use but, in reality, people need safe and accessible alternatives to personal vehicles. Why is this? In a typical community, about 20 to 40 per cent of members are not able to drive a car for different reasons, such as people who do not have a licence (typically younger or older people), people who cannot afford personal vehicle ownership or those with disabilities who cannot drive<sup>9</sup>. There are also those who prefer alternative forms of transportation such as walking or cycling, and those who should not be driving during certain trips due to impairment, health conditions or economic constraints<sup>9</sup>. To justly serve all members of society, access to multiple transportation options is a must.

A well-designed MMT system has several robust components to meet varying needs:

- Strong active transportation network that connects trip origins and destinations, and centres on the safety of vulnerable road users through infrastructure such as vehicle-separated pedestrian and bike routes<sup>10</sup>.
- Accessible public transit network that provides frequent, reliable and affordable service, as well as efficient travel times<sup>11</sup>.
- Road network that supports public transportation, ride-sharing and solo vehicle use, with safety built in for vulnerable road users. Vehicles are still a necessary form of transportation for those who ride-hail, rideshare, transport freight or services, or require a solo vehicle ride, but they shouldn't be the only viable option for getting around.

It is also important to note that networks should not operate in isolation of each other but are well integrated since transit riders, for example, are most likely to walk or cycle to get to a transit hub<sup>12</sup>. It has been shown that if someone is able to walk or roll to transit (which includes not only a safe path to get to transit, but also the ability to store a bicycle, for example), they are more likely to be a frequent transit user<sup>11</sup>. Road users

themselves are not unimodal in the form of transportation they use for daily trips or even within single trips<sup>11</sup>, and will use multiple modes of transportation for trips if it is the most efficient option.

This leads to a final but key component of building MMT systems, which is equity. “When implementing this approach, it will be important we do not continue to perpetuate structural inequalities in serving and respecting the needs of people of all backgrounds,” says Ngo, “including age, sex, gender, race, class, religion, ethnicity, immigration status and ability.”

People vary in how they get around, but they also vary in what keeps them safe when getting around. It is well documented that residents of low-income neighbourhoods and communities of colour, who are more likely to use active and public transportation, are injured and killed by traffic collisions at higher rates than residents of other communities<sup>13,14</sup>. Male pedestrians also have a higher injury and fatality rate than female pedestrians<sup>15,16</sup>. Ngo explains, “municipalities can do a better job to protect our vulnerable road users from automobiles, but there are also other social, economic, and political forces that impact whether someone feels comfortable in how they travel that municipalities can directly or indirectly address. This will help secure marginalized communities’ ‘right to the city’ and advance mobility justice to improve accessibility.”

### ***Multi-modal transportation and GHG emission reduction***

A key benefit and reason for why MMT is so highly encouraged by environmental advocates is the fact that it helps reduce GHG emissions from individual vehicle use. Conventional transportation systems that rely heavily on individual vehicles for transportation needs, such as commuting and day-to-day tasks, are just not environmentally sustainable. Electric vehicles and low-carbon fuels are an alternative to address this issue, but their usage is limited and alone will not solve this issue. MMT systems provide people with both the options and the encouragement to use alternate modes of travel that reduce their GHG emissions.

Ngo helped lead a study<sup>17</sup> in Vancouver that was one of the first to provide direct evidence that promoting MMT through urban greenways can reduce neighbourhood GHG emissions. He explains their study and findings:

The Comox-Helmcken Greenway aims to provide a safe, convenient and comfortable active transportation route in Vancouver's West End and Downtown neighbourhood for people of all ages and abilities. The urban greenway prioritizes people walking, cycling and rolling through measures such as the provision of dedicated cycling facilities; reducing volumes to less than 500 vehicles per day; setting a speed limit of 30 km/h; creating safer crossings at intersections; providing opportunities for seating to facilitate social interactions; and providing additional green space and landscaping. (See Figure 1 for examples of the changes implemented.)



**Figure 1** Changes to the neighbourhood after the Comox-Helmcken Greenway.

*Reprinted from Transportation Research Part D: Transport and Environment, 62, Ngo, V. D., Frank, L. D., & Bigazzi, A. Y. (2018). Effects of new urban greenways on transportation energy use and greenhouse gas emissions: A longitudinal study from Vancouver, Canada, with permission from Elsevier.*

Led by Dr. Lawrence Frank at the University of British Columbia's Health & Community Design Lab, our team tracked a group of residents of more than 500 residents for a period of three years. We found that residents living near the greenway reduced their personal greenhouse gas emissions by 21 per cent. This was attributed to people driving or taking the bus less after the greenway was built, even after carsharing services were becoming more popular in the city during the same period. We found people were more likely to be physically active, less sedentary and more likely to bike when compared to a control group of residents living further from the greenway.

One novel aspect of our study was the inclusion of a control group that did not benefit from the construction of the greenway in order to isolate the effect of the new active transportation route from other factors that may influence how people travel. This allowed us to better establish a causal relationship between the type of transportation infrastructure we build and how people travel. As both a researcher and practitioner, an important principle that guides my practice is ensuring transportation practitioners and decision-makers are guided by the latest scientific evidence.

As the study findings highlight, access to an active transportation network allowed participants living in the vicinity of the Comox-Helmcken Greenway to reduce their GHG emissions by 21 per cent. There are limited studies looking at the relationship between active transportation and GHG emissions in Canada but another study, conducted in Montreal, looked at the effect of new cycling facilities on GHG emissions and showed a reduction of close to 2 per cent in GHG emissions for an increase of 7 per cent in the length of the bicycle network<sup>18</sup>.

It is important to note, though, that introducing active and public transportation networks alone may not have the intended effect of shifting away from personal vehicle use or reducing GHG emissions. Experts have suggested that, in order for there to be actual uptake of active transportation modes, there also needs to be a comprehensive plan with policies that target shifting away from personal vehicle use<sup>19</sup> and make active transportation or public transit the easier, more convenient choice.



## Multi-modal transportation and road safety

An effective MMT system will lead to an increase in pedestrians and cyclists, so a crucial part of building a safe and accessible MMT system is to evaluate the safety risks to vulnerable road users. This is necessary to prevent and address risks through road safety planning and Vision Zero principles. Evidence shows that urban roads, with speeds of 70 km/hr or less and near intersections where pedestrians cross, are locations where pedestrian fatalities and collisions are most likely to occur<sup>20</sup>. In Ontario, one in seven pedestrian deaths occur while the pedestrian is crossing with the right of way at an intersection and are more prevalent among males than females<sup>21</sup>. Similarly, vehicle collisions causing cyclist fatalities are most likely to occur in an urban setting<sup>22</sup>, such as intersections and locations with traffic controls or signals<sup>23</sup>.

Understanding these risks, MMT systems must build evidence-based infrastructure to prevent these events before they happen. As Ngo explains,

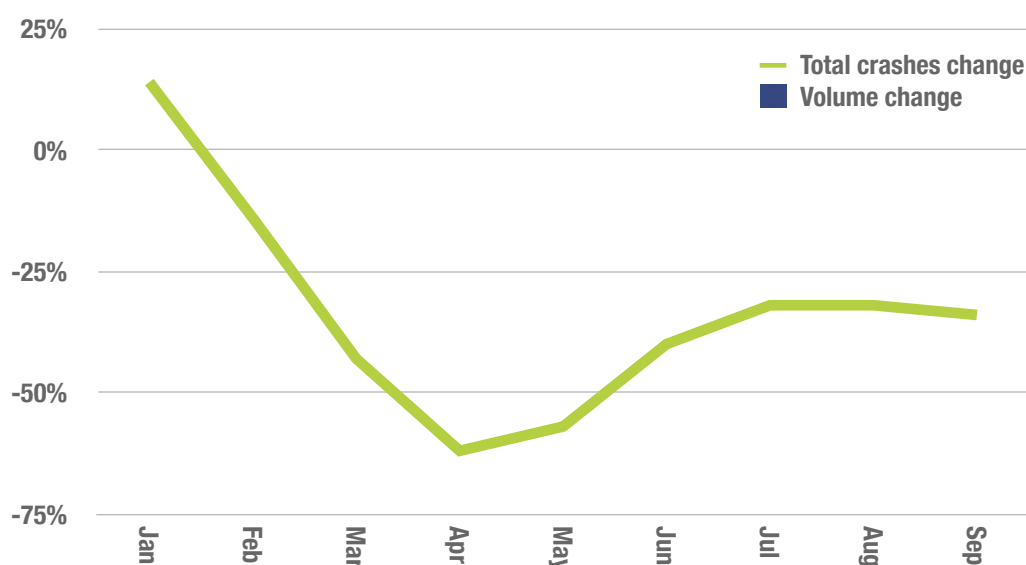
The majority of pedestrian- and cyclist-involved collisions involve situations where the pedestrian and cyclist have the right-of-way, so it is important that we rethink how we design our transportation system to prioritize the lives of people who walk, cycle or roll. For example, we know from the research that higher-quality cycling infrastructure (e.g., off-street multi-use pathways, protected on-street cycling lanes) are associated with improved safety performance. This means that there are observable benefits in terms of reducing the likelihood of collisions for cyclists.

In addition to intentionally building road safety measures for pedestrians and cyclists into MMT systems, mode shift through MMT can also make roads safer through a “safety in numbers” effect. Jessica Lamarre, who leads the development of the Safe Mobility Strategy in Edmonton, explains:

Mode shift makes our roads safer. Research has shown that there is safety in numbers, as when more people choose not to drive, there are reductions in crashes. For example, one study found that when the number of people walking and cycling doubles, their risk of being in a crash decreases by 66 per cent.<sup>24</sup> By creating safer infrastructure and supporting culture change around street equity and the value we place on others’ safety through our

actions and behaviours on the road, we improve safety for all – especially vulnerable road users.

In 2020, Edmonton experienced a significant reduction in vehicle volumes due to the impact of COVID-19. As a result, we were able to clearly see what happens when we lower the number of vehicles on the road. At one point, vehicle volumes were almost 50 per cent less than is typical. The change in how people are travelling is making the roads safer. There has been a 75-per-cent reduction in the number of people injured in crashes this year. Even after the numbers have returned to near normal with people returning to work, school and other daily activities along with Alberta's relaunch phase, overall traffic volumes continue to remain roughly 15 per cent lower than in previous years. Even this smaller change in traffic volumes has led to reduced crashes, as shown in the graph below.



**Figure 2** Traffic volume change and total crashes (based on data available on Nov 10, 2020)

*Source: City of Edmonton*

Sadly, with few cars on the road, there was an opportunity for excessive speeding. Despite the presence of speed enforcement (automated and in-person), there was a 30-per-cent increase in drivers speeding more than 20 km/h over the speed limit and more than 200-per-cent increase in drivers speeding more than 50 km/h over the speed limit in March and April

2020. Although we saw a huge decrease in crashes overall and reduction in the number of people injured in crashes, the number of people killed on the roads was not reduced, and many of the fatal crashes in 2020 were at least partially attributed to unsafe speed. However, the number of vulnerable road users killed was lower compared to previous years.

A study in Toronto showed a similar trend, where from January to June 2020 there was a decrease in vehicle volume as well as a decline in road traffic collisions<sup>25</sup>. But similarly, reduced traffic volumes also resulted in increased vehicle speeds and stunt driving - a phenomenon seen across Canada as well as internationally.

Edmonton and Toronto's cases above provide examples of how decreased numbers of vehicles on the road correlated with a reduction in the number of collisions and people injured. But a decrease in vehicles, and a potential increase in pedestrians and cyclists – the goal of MMT – may not necessarily mean fewer deaths on the road if safety is not purposefully integrated into the MMT approach. New and adaptive strategies must continually be employed by municipalities and traffic safety leaders to address changes to pedestrian and road traffic patterns.

## **Building road safety and climate action into municipal transportation planning**

It is evident that road safety goals and climate action are two key pillars for a robust and accessible transportation plan, one that can be achieved through MMT. But implementing these principles in practice is a challenge Canadian municipalities and planners continue to tackle as they build and evolve existing transportation plans. Ngo explains one part of this challenge:

Critics often describe initiatives to reallocate road space from automobiles to other modes of transportation as a “war on the car.” This is a gross mischaracterization of the issue and ignores the ongoing violence directed at vulnerable road users, with tens of thousands of pedestrians and cyclists losing their lives every year across the world. This reality should be simply unacceptable for practitioners who are directly involved in the planning and design of our transportation infrastructure.



**Figure 3** Example of Edmonton's Shared Streets pilot in Spring 2020, where roadways were open for people to walk, bike or drive; implemented through lane closures, traffic restrictions and reduced speeds

*Source: City of Edmonton*

The reality is that transportation systems such as MMT are not built to wage a war on cars but are designed out of a need for safer, more accessible and climate-friendly transportation options. Conventional, car-dominant transportation systems are no longer meeting the varied and valid needs of urban users, so municipalities must work to address these gaps.

Fortunately, municipalities in Canada are taking up the challenge to develop more equitable, safe and climate-friendly transportation networks. Lamarre, through her work in Traffic Safety for the City of Edmonton, shares their approach to integrating road safety, climate action and climate resilience (the ability to prepare for, recover from and adapt to the impacts of climate change<sup>26</sup>) into transportation planning. First, she shares their road safety planning considerations:

The City of Edmonton's strategic plan, [ConnectEdmonton](#), highlights climate resilience, healthy city and urban places as three of its strategic goals, and the work of the [Safe Mobility Strategy](#) directly connects road safety to this important work. The [City Plan](#), Edmonton's municipal development plan and transportation master plan, outlines the choices we need to make to live out the vision of ConnectEdmonton. Some examples of directions and intentions included in the City Plan that connect to road safety are:

- Ensure that development occurs in an orderly and safe manner to protect public health and the environment.
- Ensure that walkable and attractive mixed-use development occurs at nodes and along corridors in a manner that is integrated with accessible mass transit.
- Ensure public buildings and infrastructure are sustainable and resilient.
- Encourage and support emerging mobility technologies in alignment with a compact, livable community.
- Support inviting and inclusive transportation options for Edmontonians of all ages, abilities and incomes.
- Ensure safety of all users in the planning and design of city infrastructure, networks and spaces.



**Figure 4** Examples of Edmonton's Shared Streets pilot in Spring 2020

*Source: City of Edmonton*

Lamarre also lists considerations for integrating climate action through transportation:

- The goals of Vision Zero and of climate action are linked by the need for mode shift, and these goals are intimately connected.
- Exploring the livability of impacts of our transportation network reveals that air and noise pollution are major livability concerns. This highlights the need for climate action.

- The need for climate action is clear when we explore the relationship between extreme weather trends and road safety.
- Some of the unintended consequences of a transportation system that depends on personal vehicle ownership and that prioritizes car travel over other modes include:
  - Safety: more cars on the road leads to more crashes
  - Climate: increased vehicle emissions
  - Financial: the cost of road maintenance, parking requirements, and infrastructure

## Moving forward

Beyond serving as a powerful tool for climate action and creating safer roads to reach Vision Zero goals of no serious injuries or deaths, MMT provides many other societal benefits. By encouraging mode shift toward active transportation, MMT helps cut down on air and noise pollution, reduces traffic congestion and encourages increased physical activity and health benefits such as lower mortality and cardiovascular risk<sup>27</sup>. MMT can also help the local economy, as pedestrians and cyclists tend to spend more money at local businesses than those in cars and active transportation projects create more jobs per dollar spent than road building projects<sup>28</sup>. Given these far-reaching benefits across various sectors, the goals of MMT should also be shared and championed through cross-sector collaboration.

Similar to the Vision Zero model of collaboration across divisions such as engineering, public health, education and enforcement, leaders should also look to collaborate across sectors to achieve the road safety and climate action goals of MMT. As Lamarre describes in Edmonton:

People are incredibly interested in safe mobility and understand how integral it is in our daily lives, impacting both our safety and the livability of our city. Through the Safe Mobility Strategy, partnership with the academic research community has been highlighted as a key action. Gathering a wide variety of perspectives, including human psychology, public health, engineering, urban planning, and diversity and inclusion will help to explore the wide-ranging aspects of safe mobility.

Additionally, partnerships with our police service, community groups and citizens in participating in programs and projects to advance street safety is pivotal to our success.

In addition to working across sectors, it is important to continue to keep equity in the forefront of conversations around MMT and transportation. Whether it's the climate crisis in Canada or road safety risks, marginalized communities will face worse outcomes. Systems must be built to be accessible and just for everyone living in communities.

As evidenced throughout this case study, MMT has the potential to contribute to a vast number of societal benefits, in particular to climate action and improved road safety. But the success of its implementation and uptake by the public requires the co-operation and collaboration of many different sectors and a consistent focus on equity. It is now more urgent than ever to address climate and road safety challenges in Canada so all Canadians must do their part to come together to support systems, such as MMT, to combat these threats.



## Appendix A: Expert Interviews

### ***Victor Ngo (School of Population and Public Health, UBC; WATT Consulting Group)***

#### **What is mode shifting and/or multimodal transportation? (what makes a successful multi-modal transportation system?)**

A multi-modal transportation system creates a safe, convenient and comfortable environment that provides choice for people in how they want to move around in a community, whether by walking, cycling, rolling, transit or driving. This perspective is one of the fundamental principles driving the Complete Streets movement.

Creating a successful multi-modal transportation system will mean prioritizing *people* instead of automobiles when making decisions about the type of investments we make and how we allocate space in our communities. When implementing this approach, it will be important we do not continue to perpetuate structural inequalities in serving and respecting the needs of people of all backgrounds, including age, sex, gender, race, class, religion, race, ethnicity, immigration status and ability.

#### **How can multimodal transportation reduce GHG emissions from the transportation sector? What evidence have you seen in your own work or the work of your colleagues?**

Our study of the Comox-Helmcken Greenway in the City of Vancouver provides some of the first direct evidence that promoting multi-modal transportation through urban greenways can reduce neighbourhood greenhouse gas emissions. The Comox-Helmcken Greenway aims to provide a safe, convenient and comfortable active transportation route in Vancouver's West End and Downtown neighbourhood for people of all ages and abilities. The urban greenway prioritizes people walking, cycling and rolling through measures such as the provision of dedicated cycling facilities; reducing volumes to fewer than 500 vehicles per day; setting a speed limit of 30 km/h; creating safer crossings at intersections; providing opportunities for seating to facilitate social interactions; and providing additional green space and landscaping.

Led by Dr. Lawrence Frank at the University of British Columbia's Health & Community Design Lab, our team tracked a group of residents of more than 500



residents for a period of three years. We found that residents living near the greenway reduced their personal greenhouse gas emissions by 21 per cent. This was attributed to people driving or taking the bus less after the greenway was built, even after carsharing services were becoming more popular in the city during the same period. We found people were more likely to be physically active, less sedentary, and more likely to bike when compared to a control group of residents living further from the greenway.

One novel aspect of our study was the inclusion of a control group that did not benefit from the construction of the greenway in order to isolate the effect of the new active transportation route from other factors that may influence how people travel. This allowed us to better establish a causal relationship between the type of transportation infrastructure we build and how people travel. As both a researcher and practitioner, an important principle that guides my practice is ensuring transportation practitioners and decision-makers are guided by the latest scientific evidence.

### **What are the other benefits of multimodal transportation for municipalities and road users?**

Critics often describe initiatives to reallocate road space from automobiles to other modes of transportation as a “war on the car.” This is a gross mischaracterization of the issue and ignores the ongoing violence directed at vulnerable road users, with tens of thousands of pedestrians and cyclists losing their lives every year across the world. This reality should be simply unacceptable for practitioners that are directly involved in the planning and design of our transportation infrastructure.

The majority of pedestrian- and cyclist-involved collisions involve situations where the pedestrian and cyclist have the right-of-way, so it is important that we rethink how we design our transportation system to prioritize the lives of people who walk, cycle or roll. For example, we know from the research that higher-quality cycling infrastructure (e.g., off-street multi-use pathways, protected on-street cycling lanes) are associated with improved safety performance. This means that there are observable benefits in terms of reducing the likelihood of collisions for cyclists.

### **What is your sense of collaboration across sectors (environment, transportation, public health)? Is it happening? Is it growing?**

Transportation agencies at the local, regional, and national level are increasingly including environmental and public health considerations in their planning and

decision-making process. This includes an assessment of impacts of new transportation infrastructure and programs using a variety of measures such as vehicle kilometres travelled, greenhouse gas emissions, air quality, physical activity, Body Mass Index.

The UBC Health & Community Design Lab led a study called Where Matters: Health and Economic Impacts of Where We Live. It is a partnership of various agencies that have overlapping responsibilities for land use, transportation, public health and the environment, including Metro Vancouver, TransLink, Vancouver Coastal Health, Fraser Health and the City of Vancouver. Using a dataset of more than 30,000 Metro Vancouver residents that contained detailed information on their health and wellbeing, we were able to quantify how transportation investment, neighbourhood walkability and access to green space are associated with less chronic disease and lower health-care cost.

This unique partnership resulted in policy recommendations that will help address the complex relationships between the built and natural environments and public health. It also highlights how planners and engineers need to consider the equity impacts of their practices. For example, one conclusion from the study was that if lower-income residents are priced out of the housing market and forced to live in areas with lower walkability and park access, this will exacerbate health and housing inequities compared to higher-income residents. Transportation cannot be divorced from conversations of real estate and housing affordability as they represent the top two largest expenditures for many households. A common guideline used in Canada is that households living in affordable housing should spend no more than 30 per cent of their income. This has resulted in new measures such as combined household and transportation costs (H+T) that evaluates the affordability of a community in a more holistic manner, a topic of great concern for the real estate development industry as it seeks to find new ways to improve housing affordability for Canadians. Providing multi-modal transportation options can contribute to overall affordability.

Bridging the gap from research to practice, the development of the Metro Vancouver 2050 Regional Greenways Plan is another example of growing collaboration between different sectors. It shows how transportation, environmental and public health matters can be considered and integrated in a single planning document. Metro Vancouver has identified the importance of providing a regional greenway network and improve conditions for multi-modal transportation as it can support active lifestyles, reduce traffic, lower greenhouse gas emissions, and provide wildlife with links between natural areas.

**Do you think Canadian municipalities are doing enough to build active transportation infrastructure into their planning, and what are your hopes for the future?**

Much of today's municipal transportation planning and engineering is still dominated by well-intentioned but outdated and harmful regulations that continue to perpetuate automobile-centric communities. We need a reform of many aspects of transportation planning and engineering, such as design guidelines, infrastructure funding, off-street parking regulations. This will allow us to do more to build more multi-modal transportation infrastructure.

However, in advancing what the Canadian Centre for Policy Alternatives calls a "transportation transformation", practitioners cannot forget their professional responsibilities to advance reconciliation with our Indigenous, Black and racialized communities. Municipalities can do a better job to protect our vulnerable road users from automobiles, but there are also other social, economic, and political forces that impact whether someone feels comfortable in how they travel that municipalities can directly or indirectly address. This will help secure marginalized communities' "right to the city" and advance mobility justice to improve accessibility.

***Jessica Lamarre (City of Edmonton)***

**How are municipal planners incorporating mode shifting and multimodal transportation into urban planning to reduce GHG emissions?**

The City of Edmonton's strategic plan, [ConnectEdmonton](#), highlights climate resilience, healthy city and urban places as three of its strategic goals. We know that when we make transportation options for all road users safer, mode shift and transit usage is more likely to occur. Through the Safe Mobility Strategy, a particular focus on liveability will address concerns within neighbourhoods that may be preventing them from choosing to walk or bike as a mode of transportation. Additionally, crash and equity analysis from the Safe Mobility Strategy will be integrated into the next steps of our Bike Plan implementation and inform a review of transit stop vulnerable road user safety. We know that reducing vehicle kilometres travelled, a key factor in traffic safety, supports reduced GHG emissions and air quality, and this has been highlighted in the Safe Mobility Strategy and the [City Plan](#), Edmonton's municipal development plan and transportation master plan.

**What effect does increased mode shifting have on the road safety of vulnerable road users?**

Mode shift makes our roads safer. Research has shown that there is safety in numbers, as when more people choose not to drive, there are reductions in crashes. For example, one study found that when the number of people walking and cycling doubles, their risk of being in a crash decreases by 66 per cent<sup>24</sup>. By creating safer infrastructure and supporting culture change around street equity and the value we place on others' safety through our actions and behaviours on the road, we improve safety for all, especially vulnerable road users.

In 2020, Edmonton experienced a significant reduction in vehicle volumes due to the impact of COVID-19. As a result, we were able to clearly see what happens when we lower the number of vehicles on the road. At one point, vehicle volumes were almost 50 per cent less than is typical. The change in how people are travelling is making the roads safer. There has been a 75-per-cent reduction in the number of people injured in crashes this year. Even after the numbers have returned to near normal with people returning to work, school and other daily activities along with Alberta's relaunch phase, overall traffic volumes continue to remain roughly 15 per cent lower than in previous years. Even this smaller change in traffic volumes has led to reduced crashes.

Sadly, with few cars on the road there was an opportunity for excessive speeding. Despite the presence of speed enforcement (automated and in-person), there was a 30-per-cent increase in drivers speeding more than 20 km/h over the speed limit and more than 200-per-cent increase in drivers speeding more than 50 km/h over the speed limit in March and April 2020. Although we saw a huge decrease in crash reductions overall, the number of people killed on the roads was not reduced, and many of the fatal crashes in 2020 was at least partially attributed to unsafe speed.

**How are Canadian municipalities and planners exploring this issue and building road safety into their climate action/transportation municipal plans?**

The City of Edmonton's strategic plan, [ConnectEdmonton](#), highlights climate resilience, healthy city and urban places as three of its strategic goals, and the work of the [Safe Mobility Strategy](#) directly connects road safety to this important work. The [City Plan](#), Edmonton's municipal development plan and transportation master plan, outlines the choices we need to make to live the vision of ConnectEdmonton out. Some examples of directions and intentions included in the City Plan that connect to road safety are:

- Ensure that development occurs in an orderly and safe manner to protect public health and the environment.
- Ensure that walkable and attractive mixed-use development occurs at nodes and along corridors in a manner that is integrated with accessible mass transit.
- Ensure public buildings and infrastructure are sustainable and resilient.
- Encourage and support emerging mobility technologies in alignment with a compact, livable community
- Support inviting and inclusive transportation options for Edmontonians of all ages, abilities and incomes.
- Ensure safety of all users in the planning and design of city infrastructure, networks and spaces.

**Do you have any recommendations for municipalities on how to build climate action (through GHG emission reduction) into their Vision Zero transportation and road safety planning?**

- The goals of Vision Zero and of climate action are linked by the need for mode shift, and these goals are intimately connected.
- Exploring the livability of impacts of our transportation network reveals that air and noise pollution are major livability concerns. This highlights the need for climate action.
- The need for climate action is clear when we explore the relationship between extreme weather trends and road safety.
- Some of the unintended consequences of a transportation system that depends on personal vehicle ownership and that prioritizes car travel over other modes include:
  - ▶ Safety: more cars on the road leads to more crashes
  - ▶ Climate: increased vehicle emissions

- ▶ Financial: the cost of road maintenance, parking requirements, and infrastructure

**What is your sense of collaboration across sectors (environment, transportation, public health)? Is it happening? Is it growing?**

People are incredibly interested in safe mobility and understand how integral it is in our daily lives, impacting both our safety and the livability of our city. Through the Safe Mobility Strategy, partnership with the academic research community has been highlighted as a key action. Gathering a wide variety of perspectives, including human psychology, public health, engineering, urban planning and diversity and inclusion will help to explore the wide-ranging aspects of safe mobility. Additionally, partnerships with our police service, community groups and citizens in participating in programs and projects to advance street safety is pivotal to our success.

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