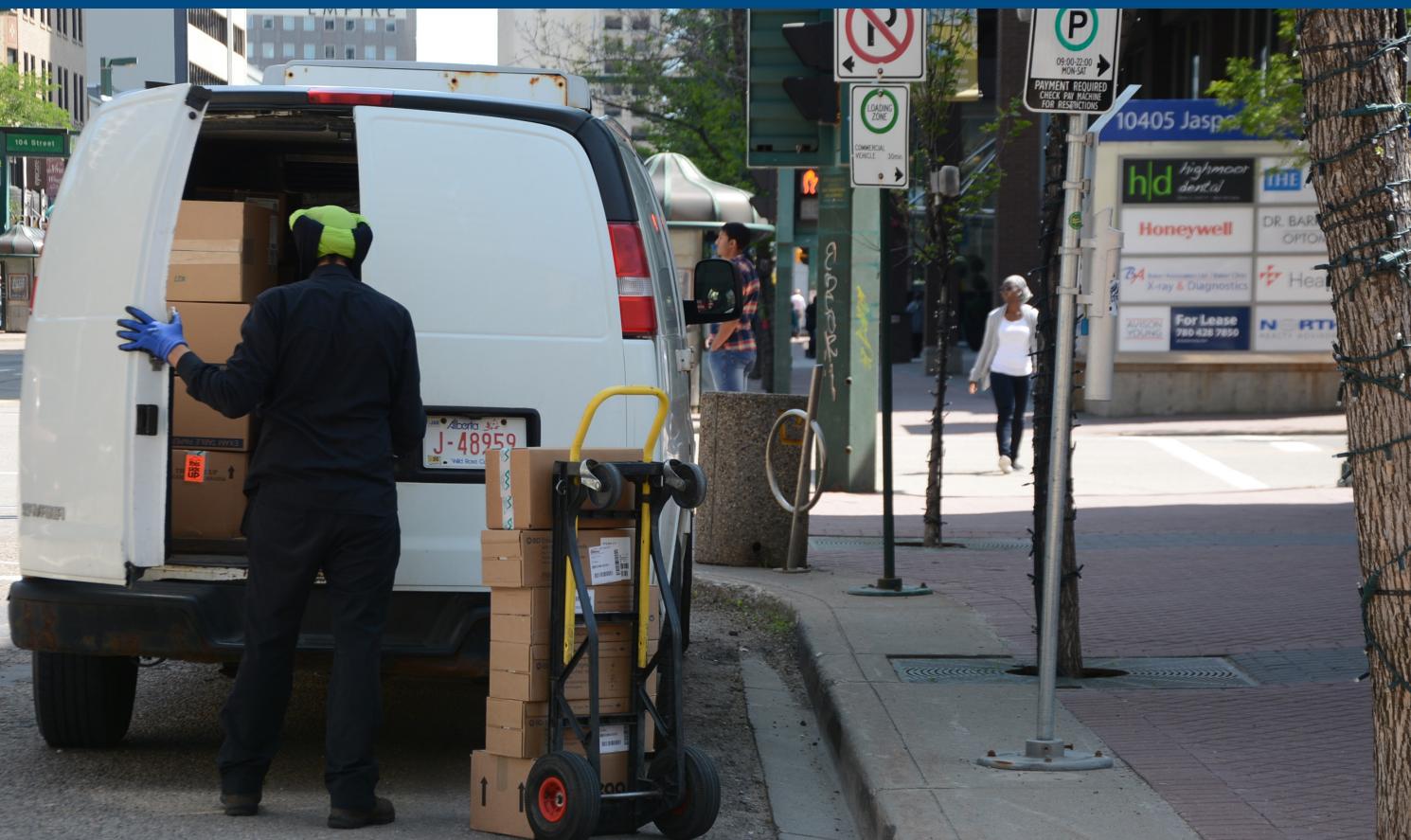


Moving Edmonton to efficient, low-carbon, urban freight delivery

How to reduce “last-mile” vehicle emissions in the
new online-to-doorstep economy

Janelle Lee, Vincent Morales
September 2020



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Executive summary

The City of Edmonton is looking for ways to increase efficiency, and reduce emissions, in the growing number of short-haul or “last-mile” freight-delivery trips required to serve the new online economy.

Edmonton has demonstrated its leadership in tackling the climate crisis and its determination to stay within its carbon budget of 135 megatonnes of CO₂e, currently equivalent to a net-zero emissions target, by 2050. In advance of preparing an updated climate strategy to align with the global target of limiting the Earth’s temperature increase to 1.5° Celsius, as per the Paris Agreement, the City commissioned this report to identify opportunities to reduce GHG emissions in urban freight. The City identified seven significant groups of actions, or “climate shifts,” that need to be taken to reduce emissions. The solutions identified in this report relate to the second climate shift: “Low carbon city and zero emissions transportation.”

The movement of goods is critical to any well-functioning city. Indeed, its importance has been underscored during the COVID-19 pandemic — goods movement is necessary to ensure that households, hospitals, and other organizations are receiving essential items, including food and medical supplies. Given the pivotal role of freight delivery within urban areas, it is important that municipalities work with businesses to plan and prepare for fast-paced changes in the way people shop and receive items.

It is also crucial to understand and manage the impact of goods movement on our environment. As urbanization, online shopping, and the demand for same-day and home deliveries increase, more freight vehicles will be on our roads, contributing to greenhouse gas (GHG) emissions and air pollution. As a result, Canadian cities like Edmonton are challenged to decarbonize increased urban freight activity. At the same time, issues such as traffic congestion, curbside competition, and increasing delivery demand are making it more challenging for businesses to deliver goods in cities. As consumer behaviours change and last-mile delivery trips become a common part of the urban transportation landscape, it will be important for cities to plan for, and adapt to, these changes in order to manage the impact of urban freight activity on our environment and communities.

The purpose of this report is to describe Edmonton’s urban freight situation and identify ways that the City can achieve its long-term strategic goods-movement and climate change objectives by decarbonizing urban freight activity. Stakeholder

interviews and a jurisdictional scan of best practices were conducted to understand key urban freight issues in Edmonton and to identify approaches taken by other jurisdictions to manage and decarbonize the goods-movement sector.

Based on knowledge gained from stakeholder interviews and the jurisdictional scan, we recommend that the City of Edmonton consider the recommendations here to improve its understanding and management of goods movement in the city, and to stay within its carbon budget in the long-term future by decarbonizing urban freight activities.

Recommendations

1. Conduct an urban freight study, which includes stakeholder engagement and data collection, to understand urban freight operations and industry needs, trends, and challenges. The study should focus on light- and medium-duty trucks and smaller delivery vehicles that are common for last-mile deliveries.
2. Informed by technical studies on urban freight activities, update the 2014 Edmonton Goods Movement Strategy to manage and plan for the growing impact of and changes to urban freight activity in the city.
3. Building on Edmonton's electric vehicle strategy, develop a long-term electric vehicle strategy for commercial freight vehicles.
4. Integrate tactics to decarbonize urban freight activity into the City's forthcoming Community Energy Transition Strategy as part of the second climate shift on "Low carbon city and zero emissions transportation" (see tactics listed in Table 1).

Table 1: Recommended tactics for a low-carbon transportation system for Edmonton's Community Energy Transition Strategy

Climate Shift #2: Low-carbon city and zero-emissions transportation Opportunity Area: Urban freight	
1)	Work with businesses in the urban freight sector to implement delivery models that improve last-mile delivery efficiency <ul style="list-style-type: none"> a) Explore opportunities to partner with courier businesses to establish a microhub and cargo bike delivery pilot in downtown Edmonton b) Explore opportunities to partner with courier businesses to establish a common carrier parcel locker system in municipal office buildings c) Investigate zoning bylaws that could require common carrier parcel lockers in high-density residential or commercial buildings
2)	Evaluate and implement curbside management solutions to reduce cruising activity caused by curbside competition <ul style="list-style-type: none"> a) In consultation with key stakeholders, identify potential locations in the city, particularly in the downtown, that can be converted into designated courier loading zones or delivery staging zones b) Conduct a feasibility study on freight zone pricing to understand the costs and benefits to urban freight businesses c) Investigate the need for and benefits of off-peak deliveries
3)	Evaluate and provide the policies and infrastructure needed to help businesses adopt low- and zero-emission vehicles into their delivery fleets <ul style="list-style-type: none"> a) Develop an electric vehicle strategy to support commercial procurement and use of electric urban freight vehicles b) Establish a government procurement policy that requires the City to hire carriers that use low-carbon fleets or have implemented delivery operations to reduce emissions c) Explore the feasibility and efficacy of a low-emissions zone in Edmonton and identify the most suitable locations for a low-emissions zone d) Explore the feasibility and efficacy of an e-commerce tax on items delivered by fossil-fueled vehicles to encourage businesses to adopt zero-emission fleets

1. Introduction

Goods movement is a backbone of Alberta's local and regional economies. In 2019, the transportation and warehousing sector accounted for \$16 billion of Alberta's GDP, an increase of 40% from 2009.¹ Goods movement is an integral part of the economic prosperity of Edmonton and its surrounding regions, but increased freight activity can also have negative impacts on our environment and our communities if not managed appropriately. Overall freight emissions in the country (which include emissions from trucks, rail, air and marine activities) are projected to eclipse passenger emissions by 2030 (Figure 1).

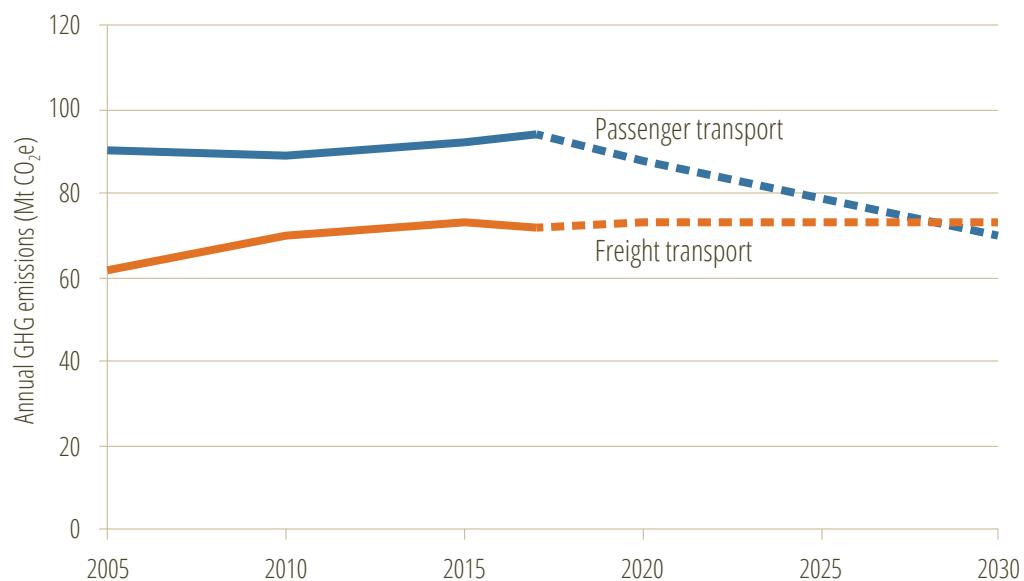


Figure 1. Emissions projections to 2030 for passenger and freight transport

Data source: Government of Canada²

The City of Edmonton does not specifically report on freight GHG emissions; however, transportation GHG emissions accounted for 31% of the city's total emissions in 2018,

¹ Government of Alberta, "Gross Domestic Product," June 22, 2020.

<https://economicdashboard.alberta.ca/GrossDomesticProduct#type>

² Government of Canada, *Canada's Fourth Biennial Report on Climate Change* (2019), Table A2.4.

https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/1687459_Canada-BR4-1-Canada%20Fourth%20Biennial%20Report%20on%20Climate%20Change%202019.pdf

which increased by 2.3% from the previous year.³ This means that about 1,500 tonnes of CO₂e is emitted on an average weekday on City of Edmonton roads.⁴ To give a sense of the scale of commercial vehicle movements in Edmonton, regional models suggest that commercial vehicles travel approximately 1.5 million kilometres on Edmonton roads on a typical weekday compared to about 19 million kilometres for passenger vehicles.⁵

The City of Edmonton has taken steps to reduce greenhouse gases from its own public operations (e.g. in city-owned buildings, municipal fleets, and waste management) and the larger Edmonton community.⁶ In 2015, Edmonton's City Council approved a Community Energy Transition Strategy which identifies opportunities to decrease transportation-related GHG emissions, although it mostly focuses on passenger movement.⁷

In 2019, Edmonton's City Council declared a climate emergency and voted to update the Energy Transition Strategy to align with the international target recommended by the UN Intergovernmental Panel on Climate Change: keeping the increase in global average temperatures under 1.5 degrees Celsius compared with the pre-industrial era.⁸ As a part of the strategy development process, the City identified seven groups of measures it must take to avoid overspending its carbon budget of 155 Mt of CO₂e between 2017 and 2050.⁹ “Low-carbon city and zero-emissions transportation” is Edmonton’s second “climate shift.” To achieve this, goods movement will need to be decarbonized along with passenger movement to reach carbon neutrality by 2050.

Beyond the environmental imperative, freight activity — specifically urban freight activity — also has implications for the livability of cities. Urban freight refers to the various activities involved in the delivery of goods — including collection, storage,

³ Edmonton Citizen Dashboard, “Measuring Community GHG Emissions.” <https://dashboard.edmonton.ca/stat/goals/yujd-4pdd/etge-hz36/kmuu-rpk6>

⁴ Howaida Hassan, City of Edmonton, personal communication, October 8, 2019

⁵ Ibid.

⁶ Edmonton Citizen Dashboard, “Welcome to Edmonton's Citizen Dashboard.” <https://dashboard.edmonton.ca/green>

⁷ City of Edmonton, *Energy Transition Strategy: Building a Climate Resilient Edmonton* (2015). https://www.edmonton.ca/city_government/documents/EnergyTransitionStrategy.pdf

⁸ Intergovernmental Panel on Climate Change, *Special Report: Global Warming of 1.5 °C: Summary for Policymakers* (2018). <https://www.ipcc.ch/sr15/chapter/spm/>

⁹ City of Edmonton, *Getting to 1.5°C: A Discussion Paper* (2019). https://www.edmonton.ca/city_government/documents/PDF/GettingTo1-5DiscussionPaper.PDF

consolidation, and transport — in cities or other urban contexts.¹⁰ The delivery of goods in cities is made more difficult by traffic congestion, curbside competition, and high land costs to build logistics facilities close to urban centres. It also contributes to all of those issues.

The “last mile” segment of delivery trips is particularly challenging. Last-mile delivery refers to the delivery of goods from some type of consolidation centre (e.g. a warehouse, distribution centre, or micro-consolidation centre) to its final destination (e.g. a retailer’s store or customer’s home). Unlike other segments of the supply chain, the last mile is unique because each item being delivered has its own destination. A multitude of delivery destinations make last-mile deliveries time-consuming and complex because many stops are required, and delivery operators must devise the most efficient route between delivery locations. Delivery vehicle operators often spend hours stuck in traffic and must compete with other road users, such as cyclists, motorists, and ride-hailing vehicles, for the same road and curbside space. Because of congestion, a lack of loading zones, and other inefficiencies, many businesses operating in major cities around the world spend a substantial portion of their total costs on goods distribution in urban centres.¹¹

As urbanization, online shopping, and the demand for same-day and home deliveries increases, it is expected that more freight vehicles will be on our roads, contributing not only to emissions but also to traffic congestion, noise and air pollution, and greater competition for curbside space to conduct deliveries. More Canadians are shopping online and having items delivered directly to their home and offices. Between 2016 and 2018, the average number of online purchases made by Canadians increased by 58%.¹² Online shopping has also surged due to stay-at-home restrictions imposed during COVID-19 and this is expected to continue in the long term. Canada Post has cited a

¹⁰ Damian Stantchev and Tony Whiteing, *Urban Freight Transport and Logistics: An overview of the European research and policy* (European Communities, 2006), 2.

https://trimis.ec.europa.eu/sites/default/files/brochure/20060831_105348_30339_Urban_freight.pdf

¹¹ Mireia Roca-Riu, Miquel Estrada and Elena Fernandez, “An evaluation of urban consolidation centers through continuous analysis with non-equal market share companies,” *Transportation Research Procedia* 12 (2012), 371.

¹² Canada Post, *The 2019 Canadian E-Commerce Benchmark Report* (2019), 4.

https://www.canadapost.ca/assets/pdf/2019_ecomm_benchmark_report-en.pdf

30% increase in the volume of package deliveries during the pandemic.¹³ Households are also increasingly ordering groceries online and having them delivered.

Some researchers note that, although e-commerce generates more delivery vehicle trips, it is uncertain whether total vehicle movement and fuel consumption will also increase since personal shopping trips may substantially decrease.^{14, 15} Others are more definitive and say any environmental benefits gained from fewer personal shopping trips will be offset by transportation factors associated with online shopping including how often consumers opt for fast delivery, take complementary trips to a physical store to return delivered items, or make single-item purchases online, resulting in more individual deliveries by truck.^{16, 17} Furthermore, items purchased online are often delivered with multiple layers of packaging, which produces additional waste.¹⁸ In other words, online shopping has the potential to reduce overall transportation GHG emissions because it reduces the number of trips made by customers travelling to and from brick-and-mortar stores; however, those environmental benefits are eroded through common online shopping practices (e.g. rushed delivery).

Urbanization and the growth of e-commerce have put tremendous pressure on cities to manage and decarbonize increased urban freight activity. As consumer behaviours change and last-mile delivery trips become a common part of the urban transportation landscape, it will be important for cities, including the City of Edmonton, to plan for and adapt to these changes in order to manage the impact of urban freight activity on our environment and communities.

¹³ Christopher Nardi, “Canada Post warns COVID-19 measures and ‘unprecedented’ volumes are causing delivery delays,” *National Post*, April 23, 2020. <https://nationalpost.com/news/canada-post-warns-covid-19-measures-and-unprecedented-volumes-are-causing-delivery-delays>

¹⁴ Johan Visser, Toshinori Nemoto and Michael Browne, “Home Delivery and the Impacts on Urban Freight Transport: A Review,” *Procedia –Social and Behavioral Sciences* 125 (2014), 26.

¹⁵ Kenneth Boyer, Andrea M. Prud’homme and Wenming Chung, “The Last Mile Challenge: Evaluating the Effects of Customer Density and Delivery Window Patterns,” *Journal of Business Logistics* 30, no. 1 (2009), 196.

¹⁶ Andy Murdock, “The Environmental Cost of Free 2-Day Shipping,” *Vox* (2017).
<https://www.vox.com/2017/11/17/16670080/environmental-cost-free-two-day-shipping>

¹⁷ Dimitri Weideli, Edgar E. Blanco, Naoufel Cheikhrouhou and Anthony Craig, *Environmental Analysis of US Online Shopping* (2013), 4-5. http://ctl.mit.edu/sites/ctl.mit.edu/files/library/public/Dimitri-Weideli-Environmental-Analysis-of-US-Online-Shopping_0.pdf

¹⁸ Ibid.

2. Background and study purpose

The City of Edmonton's Goods Movement Strategy, adopted by City Council in 2014, sets out strategic goals to guide "transportation, funding and land use decisions to enhance the efficiency and safety of goods movement in the broader Edmonton regional context."¹⁹ As the population and employment in the Edmonton region is forecasted to increase by approximately 22% over the next 10 years²⁰, this Strategy, together with the City's Transportation Master Plan, are key long-term transportation planning initiatives to manage the existing and future demands for moving people and goods between the city and the region.

As a transportation hub for construction and heavy industry, Edmonton has largely focused its goods-movement planning work to serve the major industrial areas in the city and surrounding region. The Goods Movement Strategy emphasizes the need to improve and plan for the movement of medium and heavy trucks with a gross vehicle weight of 4,500 kg or more (e.g. pick-up trucks with a trailer, single-unit trucks, single trailers, and multi-unit trailers).²¹

The Strategy also focuses on improving truck movements in the city through better roadway operations and maintenance practices, increasing the efficiency of transportation networks, and improving on-road communication and navigation for truck drivers. However, past truck surveys and goods movement plans in Edmonton have not closely examined commercial light-duty delivery vehicles, such as cargo vans or courier trucks/package cars which are common for last-mile delivery trips. Overall, there has been limited examination of last-mile delivery activity in Edmonton and few policies exist to plan for and manage this aspect of urban freight.

Recognizing this planning and policy need, the City of Edmonton's Draft City Plan includes new policy direction to manage and decarbonize urban freight and last-mile delivery activity, such as:

¹⁹ City of Edmonton, *Edmonton Goods Movement Strategy* (2014), i.

https://www.edmonton.ca/city_government/documents/PDF/CoE_GMS_Report_2014_CR_931_WEB.pdf

²⁰ *Edmonton Goods Movement Strategy*, 11.

²¹ City of Edmonton, *Roadside Truck Survey* (2013), 10.

https://www.edmonton.ca/transportation/PDF/Roadside_Truck_Survey_Summary_Report_Feb_2013.pdf

Policy 4.3.1.1: “Enable a comprehensive and adaptive urban freight environment to serve goods movement, services and delivery while mitigating negative community, environmental and safety impacts.”²²

Policy 4.4.1.3: “Encourage last kilometre solutions for urban freight in an effort to mitigate emissions.”²³

The purpose of this report is to describe Edmonton’s urban freight context and identify ways that the City can achieve its long-term strategic goods-movement and climate change objectives by decarbonizing urban freight activity. This report includes:

- Key findings from stakeholder interviews to understand urban freight issues in Edmonton
- A jurisdictional scan of urban freight practices in Canada and internationally to manage and reduce GHG emissions from urban freight activity
- Recommended tactics and next steps that the City of Edmonton can advance to achieve its transportation decarbonization objectives.

²² City of Edmonton, *Draft Edmonton City Plan* (2020), 75.

https://www.edmonton.ca/city_government/documents/Draft_City_Plan_FINAL.pdf

²³ *Draft Edmonton City Plan*, 76.

3. Research methods

The purpose of this report is to describe Edmonton's urban freight context and identify ways that the City can achieve its long-term strategic goods-movement and climate change objectives by decarbonizing urban freight activity. The research findings presented in this report are based on two main approaches: phone interviews with stakeholders and a jurisdictional scan.

Interviews with nine urban freight stakeholders in Edmonton were conducted to understand the challenges that businesses face when moving and delivering goods in the city, and to identify solutions that businesses are contemplating, or would like to see implemented, to increase delivery efficiency and/or reduce urban freight emissions. Interviewees included business associations and representatives of a variety of individual businesses in the urban freight sector — including courier companies, freight transportation and logistics service providers, and grocery delivery companies.

Interview questions covered five themes: 1) urban delivery operations in Edmonton, 2) industry trends, 3) innovation, 4) status of goods movement data collection, and 5) disruptions and learnings from COVID-19. Interview questions are provided in Appendix A.

This report also provides the City of Edmonton with tactics and next steps that could decrease GHG emissions related to last-mile delivery while tackling the concerns identified in stakeholder interviews. Examples of emissions-reduction measures specific to urban freight and efficient delivery operations were collected following an international review of practices from cities and companies across the world. This range of policies and regulations has helped incentivize sustainable and efficient urban goods movement solutions in other jurisdictions.

4. Urban delivery operations

Delivery operations refer to how businesses distribute items from “point A to B”. When it comes to urban freight, last-mile delivery operations are particularly challenging because of their disaggregated nature. Goods must be delivered to thousands of unique locations each day (e.g. customers’ homes) rather than to one centralized location. The COVID-19 pandemic has put pressures on delivery operations — more items are being delivered because of stay-at-home restrictions and increased online shopping, and the number of deliveries being made to people’s homes and residential areas (i.e. business-to-customer deliveries as opposed to business-to-business) has significantly increased.

This section discusses the issues that goods-movement stakeholders raised when asked about their delivery operations in Edmonton, and highlights alternative delivery models that are being implemented in other jurisdictions to improve delivery efficiencies and, in turn, reduce GHG emissions. Consideration and further discussions are needed to examine the issues and applicability and feasibility of the practices outlined in this section as the City of Edmonton undertakes its long-term planning for an efficient, adaptive and sustainable urban freight system.

4.1 Interview findings

Key finding #1: Businesses prioritize safety, efficiency and customer convenience.

During the interviews, businesses shared their top priorities for moving and delivering goods in Edmonton. Several common themes emerged from the discussions which should be further elaborated upon as the City undertakes its freight policy and planning work:

- **Safety** is often a top priority for businesses — when it comes to goods movement, it is important for businesses to ensure the safety of their employees and other road users.
- **Optimizing consolidation** is a critical part of moving goods as efficiently as possible. Businesses seek to consolidate many items into one vehicle to maximize the capacity of that vehicle. Businesses also seek to consolidate packages in such a way that maximizes the number of packages delivered on a single route or within a delivery radius (sometimes referred to as “delivery density”, “drop density”, or “route density”). Delivery operations become more

economically feasible when more deliveries are made per route and when delivery locations are closer together.

- **Route efficiency** helps reduce vehicle kilometres travelled (and therefore the costs associated with travel, including time and fuel) and decreases vehicular emissions.
- **On-time delivery** is important to meeting customers' expectations, especially as the demand for quick, same-day, or same-week delivery increases.
- **Customer convenience** is about giving options and flexibility to customers to decide when they will receive their items; for example, giving customers the option to select the day and time they want their order to be delivered, or allowing customers to select a location to pick up their order on their own time.
- **Sustainability** is an increasingly important priority for businesses. Businesses are implementing and investigating solutions to reduce emissions from delivery operations, such as using low-carbon fuels, electrifying delivery fleets, retrofitting older vehicles with fuel-saving devices, and discouraging idling. Some businesses also choose to deliver to select neighbourhoods only on specific days of the week to increase route efficiency and decrease emissions, even if this means sacrificing customer convenience. Businesses with such delivery practices often have clientele who recognize and appreciate the environmental benefits of delivery consolidation and are content to wait for their items on scheduled delivery days. There is also a growing interest among businesses to incorporate circular economy practices into delivery operations in order to reduce waste (e.g. from packaging).

Key finding #2: Urban freight activities in Edmonton are undergoing transformative change with growing e-commerce activity, and changing consumer expectations and shopping preferences.

The rise of e-commerce and changing customer expectations and shopping behaviours have impacted businesses in the freight industry in different ways. Players that can provide overnight or next-day delivery services, or that adapted to provide those options, have benefited the most from e-commerce growth. Reacting to this trend was easier for major courier companies already operating in Edmonton. Smaller local players with a pre-existing online presence were more successful, as were the ones who innovated quickly to keep a market share. To be successful, businesses have had to change their operations to meet customers' expectations for fast or next-day delivery, regardless of where their goods are being shipped from, while also providing flexibility and transparency in their delivery operations. One interviewee said that meeting

customers' expectations is just as much a key issue as curbside access when it comes to delivering goods.

Urban sprawl has also made delivery operations more difficult. When customers are spread farther apart across a city, delivery trips are more time consuming and it is harder to optimize consolidation and reduce vehicle kilometres travelled (and therefore vehicular emissions).

Key finding #3: High delivery demands and growing customer expectations for fast and flexible delivery have produced new and emerging alternative delivery models and practices.

One of the growing trends in the urban freight sector is to provide customers with more options as to when and where they receive their items. One courier company noted that more customers are choosing to select a location to pick up their packages as opposed to having them delivered directly to their home. Pick-up locations help avoid missed deliveries (i.e. when customers are not home to receive their package) and package theft (i.e. when packages are left on a customer's doorstep and someone passing by steals them). In addition to expanding the number of pick-up locations, some businesses are establishing parcel lockers in apartments or other mixed-use buildings to provide flexibility to customers.

One interviewee from the grocery delivery business also explained that customers increasingly expect businesses to adopt environmentally conscious practices. As such, a critical part of their sustainable delivery model is "reverse logistics" — that is, going to customers' homes to pick up reusable packaging.

Key finding #4: Online shopping and the number of residential deliveries has surged during the COVID-19 pandemic and it is expected that this trend will continue in the long term.

With physical distancing guidelines and movement restrictions during the pandemic, there has been a surge in shopping online. Interviewees in the courier and online grocery business have seen marked increases in their sales and customer base.

Interviewees explained that the number of business-to-customer trips (as opposed to business-to-business trips) has significantly increased and therefore more deliveries are being made in residential areas. In response, some businesses have had to change their route planning and hire additional drivers to handle increased delivery demand.

The characteristics of items being delivered have also changed — larger items such as furniture and appliances are being delivered more frequently, which slows down

delivery efficiency. However, one of the positive impacts of physical distancing orders is that traffic from passenger vehicles has significantly decreased. Some interviewees noted that it has been easier and faster for delivery operators to navigate the city and find curbside parking/loading space, especially in the downtown core.

A common theme that emerged from our interviews is that high levels of e-commerce and the growing number of delivery trips being made to low-density residential areas will continue well past the pandemic. Interviewees note that customers are becoming more familiar and comfortable with online shopping and becoming accustomed to the convenience it provides.

Key finding #5: Business practices are changing to ensure the health and safety of delivery workers and customers. Companies are integrating contactless deliveries and other practices to deliver goods safely.

Like many organizations, businesses in the urban freight sector have implemented new health and safety protocols to protect workers and customers during the pandemic. Interviewees said their companies are providing delivery operators with personal protective equipment and allocating more time for drivers to sanitize delivery vehicles. Many businesses are now conducting contactless deliveries — leaving items on the doorstep of a customer's home rather than handing them to the customer directly, and no longer requiring signatures to receive packages.

One interviewee expressed concern that, as businesses, customers, and governments become hyper-focused on sanitation, we may lose focus on the importance of sustainability, particularly when it comes to waste reduction. Prior to the pandemic, one grocery delivery business that was interviewed was delivering items with reusable packaging and conducting “reverse logistics” operations (i.e. returning to customers’ homes to pick up reusable materials). Since COVID-19, many businesses that have implemented similar circular-economy practices have had to integrate single-use packaging (e.g. cardboard boxes) into their operations to allay health concerns. However, the interviewee noted that reusing materials and waste reduction do not necessarily pose higher risks if correct sanitary procedures are maintained — for example, sanitizing reusable packaging and leaving it untouched for 72 hours.

4.2 Practices in other jurisdictions

Microhubs

In order to increase last-mile delivery efficiency, some businesses and cities are implementing delivery models that consolidate goods closer to final delivery destinations. Microhubs are logistics facilities for micro-consolidation, which is the bundling of goods at a location near the final delivery point (e.g. within 1 to 5 km from the final destination).^{24, 25} Microhubs provide an additional transhipment point in the supply chain that is located in highly dense urban areas.²⁶ Other terms are also used to refer to different types of micro-consolidation operations and the facilities where consolidation occurs, including micro-consolidation centres, vehicle reception points, goods reception points, and mobile depots. In this report, we use the term “microhubs” to broadly refer to such facilities.

Microhubs are different from urban consolidation centres (UCCs), which are logistics facilities that are typically located just outside a city’s border or in a city’s suburbs where goods coming from outside of the city can be consolidated before being delivered within the city.²⁷ In many cases, one UCC is used to serve an entire urban area²⁸ and therefore a UCC is often relatively large, ranging from approximately 500,000 ft² to over 5 million ft² depending on the jurisdiction.²⁹ In contrast, microhubs have smaller

²⁴ Milena Janjevic and Alassane Balle Ndiaye, “Development and Application of a Transferability Framework for Micro-consolidation Schemes in Urban Freight Transport,” *Procedia –Social and Behavioral Sciences* 125 (2014), 285.

²⁵ Susanne Balm, Amsterdam University of Applied Sciences, personal communication, April 2, 2019.

²⁶ Janjevic et al., “Development and Application of a Transferability Framework for Micro-consolidation Schemes in Urban Freight Transport,” 285.

²⁷ Bram Kin, Sara Verlinde, Tom van Lier and Cathy Macharis, “Is there life after subsidy for an urban consolidation centre? An investigation of the total costs and benefits of a privately-initiated concept,” *Transportation Research Procedia* 12 (2016), 358.

²⁸ Julian Allen, Michael Browne, Allan Woodburn and Jacques Leonardi, “The Role of Urban Consolidation Centres in Sustainable Freight Transport,” *Transport Reviews* 32 (2012), 480.

²⁹ Michael Gogas and Eftihia Nathanail, “Evaluation of Urban Consolidation Centers: A Methodological Framework,” *Procedia Engineering* 178 (2017), 462.

footprints that can range from approximately 1,000 ft² to 10,000 ft².^{30, 31} Although UCCs are one of the most common consolidation schemes in city logistics, many businesses are experimenting with different consolidation practices, including micro-consolidation, to reimagine the size, function, and location of logistics facilities.^{32, 33}

Microhub operations may use a permanent building or a mobile structure, operate on a permanent or temporary basis, and be operated by one or more businesses in parallel. In general, though, microhub operations have five common characteristics.³⁴ They:

- Are created to reduce the number of vehicle trips in an urban area.
- Focus on the delivery of smaller and lighter loads.
- Allow goods to be transferred to a cleaner mode of transport, such as cycling or walking, for the last kilometre of delivery.
- Are typically operated by privately owned transportation companies.
- Are located within an urban area near the final delivery point.

Many of these characteristics of microhub operations are not new to the urban freight landscape in Canadian cities. Canada Post's depots, for example, are facilities closer to the final delivery point for consolidating and transferring goods into a smaller vehicle for transport. A cargo bike pilot project in Montreal uses an old bus depot as a microhub for delivery trucks to consolidate and transfer packages onto cargo bikes.³⁵

Government support is particularly important for ensuring the financial viability of microhubs. Although there are many benefits to implementing microhubs, one of the major challenges is the high cost of land in dense urban areas where microhubs are located. Incentives or financial supports provided by governments are often necessary

³⁰ Sam Clarke and Jacques Leonardi, *Agile Gnewt Cargo: parcels deliveries with electric vehicles in Central London* (Greater London Authority, 2017), 46.
<https://westminsterresearch.westminster.ac.uk/download/53a6644ba063a519a34b7cc11806396479d756214f5f785b2588c71d25dadd1c/2484777/GLA-Agile1-DataReport-3May2017.pdf>

³¹ Michael Browne, Julian Allen, Toshinori Nemoto, Daniele Patier, and Johan Visser, "Reducing social and environmental impacts of urban freight transport: A review of some major cities," *Procedia –Social and Behavioral Sciences* 39 (2012), 30.

³² Janjevic et al., "Development and Application of a Transferability Framework for Micro-consolidation Schemes in Urban Freight Transport," 285.

³³ CIVITAS, *Smart choices for cities: Making urban freight logistics more sustainable* (2015), 42.
https://civitas.eu/sites/default/files/civ_pol-an5_urban_web.pdf

³⁴ Janjevic et al., "Development and Application of a Transferability Framework for Micro-consolidation Schemes in Urban Freight Transport," 286.

³⁵ Katelyn Thomas, "Ville-Marie pilot project to use electric cargo bikes for deliveries," *Montreal Gazette*, August 8, 2019. <https://montrealgazette.com/news/local-news/ville-marie-pilot-project-to-use-electric-cargo-bikes-for-deliveries>

to offset the high real-estate costs of microhub spaces. Public financing has been used to establish micro-consolidation spaces in France. In the city of Bordeaux, for example, 90% of the cost of an Espace Logistique de Proximité (i.e. local logistics space) was publicly financed in 2003, 40-45% in 2004, and 10-15% in 2005.³⁶

Yokohama, Japan is another example of a place where governments are supporting urban freight activity in innovative ways.³⁷ The Yokohama City Government and local police have helped an association of retailers in one of the major shopping districts in the city to establish a cooperative delivery system and shared consolidation centre. The local government also subsidized the low-emission vehicles that serve the consolidation centre.

Despite the financial cost, supporting urban delivery solutions such as microhubs and cargo bikes will help governments realize public policy objectives, including relieving congestion, alleviating curbside competition, and reducing urban freight emissions and associated air pollutants. In other words, there are additional public benefits from investing in solutions that address the externalities associated with rising urban freight deliveries.

Parcel lockers

Although microhubs and parcel lockers are similar in some ways, we differentiate them in this report based on the self-serve characteristic of lockers. Lockers are very small storage units that are located close to the final delivery point in urban or rural areas, which can be conveniently accessed by customers without the help of a staff person. This is different than microhubs, where goods are delivered onward to the final destination or where staff is usually available to hand off items to customers for pickup. Lockers are often located inside retail banking locations, grocery stores, transit stations, or condominium lobbies.

Parcel lockers not only help consolidate packages (i.e. rather than items being delivered to each floor of a high-rise building, they are consolidated in a parcel locker in the building lobby), they also reduce the time and costs associated with missed deliveries. Missed deliveries occur when a customer is not at home to receive their items, and therefore delivery operators must return the package back to the depot and make

³⁶ Janjevic et al., “Development and Application of a Transferability Framework for Micro-consolidation Schemes in Urban Freight Transport,” 293.

³⁷ Browne et al., “Reducing social and environmental impacts of urban freight transport: A review of some major cities,” 25.

another delivery trip the next day. Parcel lockers allow deliveries to be made regardless of whether or not the customers are home, and customers retrieve their packages at their own convenience. Finally, parcel lockers allow for contactless deliveries in order to maintain the health and safety of delivery operators and customers, which is especially important during the current pandemic.

In Seattle, Washington, the Seattle Department of Transportation piloted a common carrier parcel locker system in the Seattle Municipal Tower, which reduced delivery times by 78% compared to business-as-usual operations and resulted in zero missed deliveries.³⁸ The common carrier system is unique in that it is made available to all retailers and delivery companies, and can be placed on public land. Typically, parcel lockers are branded and operated by a single business.

4.3 Application to Edmonton

The City of Edmonton's Draft City Plan includes language to permit the testing of urban freight solutions such as parcel lockers and microhubs. Policy statement 4.3.1.1, for example is "Enable a comprehensive and adaptive urban freight environment to serve goods movement, services and delivery while mitigating negative community, environmental and safety impacts."³⁹ Similarly, policy statement 4.4.1.3 is "Encourage last kilometre solutions for urban freight in an effort to mitigate emissions."⁴⁰ Preserving this language in the final City Plan will be a major step towards greater flexibility to decarbonize delivery operations.

³⁸ Urban Freight Lab, University of Washington, *The Final 50 Feet Urban Goods Delivery System: Common Carrier Locker Pilot Test at the Seattle Municipal Tower* (2018), 4.

http://depts.washington.edu/sctlctr/sites/default/files/SCTL_Muni_Tower_Test_Report_V4.pdf

³⁹ *Draft Edmonton City Plan*, 75.

⁴⁰ *Draft Edmonton City Plan*, 76.

5. Curbside management

Effective curbside management is integral to the safety and efficiency of cities. Based on interview responses from stakeholders, Edmonton, like many major Canadian urban centres, is experiencing increased competition for the curbside as transportation patterns and travel behaviours change. There is a growing diversity of road users seeking access to this space (e.g. cyclists and ride hailing vehicles). In particular, commercial delivery vehicles increasingly need curbside access to make deliveries to people's homes and offices as online shopping and the demand for fast and flexible deliveries grows.

But curbside management is not solely about facilitating goods movement — it is about improving mobility and safety for a variety of road users through better management of, and access to, curb space. Encouraging active transportation, for example, is contingent on our ability to better manage curbside competition and ensure that freight vehicles can safely conduct their loading/unloading activities in the presence of pedestrians and cyclists. As such, curbside management should not merely be a consideration but an integral component of all transportation plans and city building initiatives (including freight and goods-movement strategies, complete streets studies, road safety plans, and expansion of cycling networks). By strengthening Edmonton's approach to curbside management, the city is better equipped to support broader transportation goals including improving road safety, reducing congestion, encouraging cycling and other active modes, and better facilitating goods movement.

It is also important to note that effective curbside management solutions can work to reduce carbon and air pollution⁴¹ by increasing efficiencies in goods movement. A limited supply of curbside space for delivery vehicles to temporarily stop or park is problematic because it results in greater cruising activity (i.e. driving slowly around an area to find a parking space) and can increase double-parking incidents (i.e. illegally parking alongside a vehicle that is already parked at the curb). Both cruising and double-parking pose road safety risks and contribute to congestion and transportation emissions.

⁴¹ Southern Ontario Centre for Atmospheric Aerosol Research, *Near-Road Air Pollution Pilot Study* (2019). <https://www.socaar.utoronto.ca/wp-content/uploads/2019/10/SOCAAR-Near-Road-Air-Pollution-Pilot-Study-Summary-Report-Fall-2019-web-Final.pdf>

Studies estimate that between 8% to 74% of traffic in major cities is attributed to cruising activity, illustrating the magnitude and impact of curbside competition in cities.⁴² Cruising is also problematic from an environmental perspective — it increases carbon emissions not only because vehicles travel longer distances, but because slower moving vehicles are less fuel efficient. Drivers slow down to 10-12 km/h when cruising,⁴³ whereas vehicles are most efficient when they travel between 60 and 80 km/h.⁴⁴ Of course, increasing speed limits to the optimal 60 to 80 km/h range to reduce emissions should not take priority over road safety. Slower driving speeds are critical to reducing traffic-related injuries and fatalities.⁴⁵ The point here is that excessive cruising unnecessarily contributes to emissions and there are curbside management solutions that can be implemented to reduce cruising activity.

This section discusses the issues that goods-movement stakeholders raised during interviews when asked about curbside management in Edmonton, and highlights curbside management practices that are being implemented in other jurisdictions to reduce cruising activity. Consideration and further discussions are needed to examine the issues and the applicability and feasibility of the practices outlined as the City of Edmonton undertakes its long-term planning for an efficient, adaptive and sustainable urban freight system.

5.1 Interview findings

Key finding #6: Curbside management solutions, including loading and parking provisions, are needed in highly dense, high-traffic areas of the city.

Interviewees identified the need for dedicated on-street parking and loading zones and other solutions to manage curbside competition and improved access to/from downtown Edmonton and surrounding areas. Many businesses noted the lack of dedicated on-street parking and loading zones for commercial delivery vehicles in dense parts of the city and that existing loading zones are often misused. Furthermore,

⁴² Donald C. Shoup, “Cruising for parking,” *Transport Policy* 13 (2006), 479.

⁴³ Itzhak Benenson, Karel Martens and Slava Birfir, “PARKAGENT: An agent-based model of parking in the city,” *Computers, Environment and Urban Systems* (2008), 432.

⁴⁴ ECODRIVEN, *Campaign Catalogue for European Ecodriving & Traffic Safety Campaigns* (Intelligent Energy Europe, 2009), 10. https://ec.europa.eu/energy/intelligent/projects/sites/iee-projects/files/projects/documents/ecodriven_catalogue_campaign_en.pdf

⁴⁵ World Health Organization, *World report on road traffic injury prevention* (2004). <https://apps.who.int/iris/bitstream/handle/10665/42925/9241591315.pdf?sequence=1&isAllowed=y>

interviewees said that the installation of bike lanes in downtown Edmonton has removed many curbside parking and loading spaces and that they are anticipating additional spaces to be eliminated as new LRT lines are built in key delivery corridors (102 Avenue was cited as an example). Due to the lack of designated space for commercial delivery vehicles, delivery operators often have no option but to park or stop illegally. Some businesses mentioned that the number of parking tickets issued has gone up since bike lanes were implemented in downtown Edmonton.

As the City continues to plan for the public realm and right-of-way, including the expansion of active transportation facilities and public transit infrastructure in the downtown, consideration should be given to delivery vehicles and the space required to efficiently deliver goods to businesses and residents. Businesses said they welcome solutions that provide better access to designated loading space for delivery vehicles, particularly in high-density areas and near final delivery destinations. The demand for curbside access will only increase as more people shop online and have items delivered directly to their homes or offices. Curbside management solutions are also important from a sustainability perspective. When curbside use is effectively managed and delivery vehicles have reliable access to loading spaces, they spend less time cruising and idling as they find a place to stop, resulting in reduced vehicular emissions.

One of the other major barriers to delivery operations in Edmonton is poor accessibility to the downtown core. Some interviewees said their delivery drivers often get stuck on the one-way bridges that connect the south side of the city to the downtown, especially during inclement weather conditions. Other interviewees cited construction as a major contributor to congestion and the ability for businesses to make deliveries in a timely manner.

Initiatives to expand active transportation and public transit networks are imperative to providing a diversity of mobility options to people, and to help take cars off the road. It is important for the City of Edmonton to engage with urban freight stakeholders to communicate short-term or long-term planning and construction activities and co-develop solutions that minimize disruptions.

Key finding #7: The installation of bike lanes in downtown Edmonton has impacted curbside access for delivery vehicles. Improvements can be made to manage the needs of both cyclists and delivery vehicles and to minimize road safety risks.

Edmonton has installed around 7.8 km of bikeways to date in the downtown, including protected bike lanes, shared roadways, and paths.⁴⁶ Between 2005 and 2015, daily bike trips in Edmonton doubled from 25,300 to 54,800.⁴⁷ Businesses said that installing bike lanes in downtown Edmonton has removed many curbside spaces for parking and loading. Although interviewees noted that most delivery drivers have adapted by finding alternative places to stop/park, curbside access remains an issue. As in many major Canadian cities that experience curbside competition, delivery vehicles in Edmonton often double park or stop in a bike lane in order to be close to their delivery destination and to save time lost by searching for alternative places to park. This poses road safety risks, particularly for vulnerable road users including cyclists. Businesses also mentioned that the number of parking tickets issued to delivery vehicles has increased since the bike lanes were installed. Although delivery drivers do not wish to park illegally, they are sometimes faced with limited options. Solutions are needed to manage the needs of both cyclists and delivery vehicles and to minimize the risks associated with the interaction between these two road users.

5.2 Practices in other jurisdictions

To address some of the issues raised by interviewees regarding curbside management and accessing curbside space, the City of Edmonton can consider several solutions that have been implemented in other jurisdictions.⁴⁸ These are discussed below.

Courier loading zones

A growing number of delivery trips to homes and offices means there is greater need for designated loading areas, particularly in dense residential, commercial, and mixed-use neighbourhoods. Delivery vehicles rely on both on- and off-street loading and parking

⁴⁶ City of Edmonton, “Downtown Bike Network.” <https://www.edmonton.ca/transportation/using-downtown-bike-network.aspx>

⁴⁷ City of Edmonton, “Bike trips in Edmonton have nearly doubled.” https://www.edmonton.ca/transportation/PDF/Bike_Trips_Have_Doubled.pdf

⁴⁸ Institute of Transportation Engineers, *Curbside Management Practitioners Guide* (2018), 6. <https://www.ite.org/pub/?id=C75A6B8B-E210-5EB3-F4A6-A2FDDA8AE4AA>

areas to make deliveries. If there is limited supply of these spaces, it is not uncommon for delivery vehicles to double-park, which poses road safety risks and can contribute to traffic congestion and therefore transportation emissions.

In 2015, the City of Toronto implemented courier loading zones to provide designated curbside space for “short stop deliveries” with a maximum stop time of 20 minutes.⁴⁹ At the time of implementation, these zones were simply “advisory” courier loading zones (i.e. not enforceable by bylaw officers) since they were not integrated into Toronto’s municipal code. As the demand for curbside loading space from delivery vehicles continues to increase, the City intends to make these advisory courier loading zones enforceable by integrating them into relevant bylaws.⁵⁰

Freight zone pricing

Freight zone pricing requires payment to use areas designated for loading and unloading activity.⁵¹ The District Department of Transportation in Washington, D.C. implemented a commercial loading zone pricing scheme in 2015 which decreased the number of double-parking violations and non-truck parking in loading zones by more than 50%.⁵² Although the pricing scheme was initially met with pushback from delivery companies, they were eventually willing to pay the curbside fee once they realized the efficacy of the program (e.g. increased parking reliability, time savings). Freight zone pricing could be an effective way to manage curbside demand from delivery vehicles in Edmonton by encouraging businesses to use off-street loading spaces (e.g. laneways) and reducing the amount of time that delivery vehicles spend parked along the curb.

Off-peak deliveries and congestion pricing

Edmonton is the sixth most congested city in Canada, behind the other mid-size cities of Calgary and Winnipeg.⁵³ Any degree of congestion generates costs for the economy and frustration for road users. As Edmonton prepares for its “second million,” the city should consider adopting tools to ensure that population growth does not worsen

⁴⁹ Ontario Trucking Association, “Establishment of Courier Loading Zones in Toronto,” January 4, 2015. <https://ontruck.org/establishment-of-courier-loading-zones-in-toronto/>

⁵⁰ City of Toronto, *Curbside Management Strategy: Improving How Curbside Space is Used*, November 14, 2017. <https://www.toronto.ca/legdocs/mmis/2017/pw/bgrd/backgroundfile-109153.pdf>

⁵¹ *Curbside Management Practitioners Guide*, 15.

⁵² Institute of Transportation Engineers, *Case Study: Washington D.C. District Department of Transportation Study and Pilot Projects* (n.d.), 5. <https://www.ite.org/pub/?id=C29F4D5E-FE34-2037-3B96-DE312E1DBBF>

⁵³ INRIX, “INRIX 2019 Global Traffic Scorecard.” <https://inrix.com/scorecard/>

congestion. Off-peak delivery and congestion pricing, for example, can work in tandem to reduce curbside demand and improve traffic flow.⁵⁴ A congestion charge on peak-hour travel encourages businesses to make deliveries during designated off-peak hours, which frees up curbside space in high-demand periods. New York City implemented an off-peak truck delivery pilot program in 2010 where program participants agreed to conduct their deliveries between 7 p.m. and 6 a.m. A congestion charge was applied to delivery vehicles entering Manhattan at key entry points during peak congestion periods to encourage businesses to make deliveries during off-peak hours.⁵⁵ The pilot resulted in more efficient operations due to decreased congestion, better parking availability, and faster travel times.⁵⁶ Similarly, an off-peak delivery pilot program in the Peel Region in Ontario resulted in faster delivery trips (the average speed of delivery vehicles was 18.1% higher during off-peak hours than during the day time) and reduced greenhouse gas emissions (total GHG emissions per kilometre travelled decreased by 10.6%).⁵⁷

Delivery vehicle staging zones

Delivery vehicle staging zones provide time-limited on-street space to delivery trucks waiting to access off-street loading/unloading points in high-demand locations.⁵⁸ The City of Toronto, for example, is developing a pilot program at First Canadian Place — a major business tower in downtown Toronto — that will provide truck drivers with access to delivery vehicle staging zones as they wait to access the freight elevators in the building to make their deliveries.⁵⁹ Delivery vehicle staging zones located outside of office towers or other large commercial buildings may be an effective curbside management solution in Edmonton. Further investigation would be needed to identify specific buildings in Edmonton that receive many deliveries and experience backlogs of delivery drivers waiting to access curbside loading space and freight elevators.

⁵⁴ *Curbside Management Practitioners Guide*, 15.

⁵⁵ Ibid.

⁵⁶ New York City Department of Transportation, “Off-Hour Deliveries (OHD) Program” (n.d.).
<https://www1.nyc.gov/html/dot/html/motorist/offhoursdelivery.shtml>

⁵⁷ Kianoush Mousavi, Sabrina Khan and Glareh Amirjamshidi, *Pilot Off-Peak Delivery Program in the Region of Peel: Final Report* (Smart Freight Centre, 2020).
<https://www.peelregion.ca/pw/transportation/goodsmovement/pdf/Pilot-OffPeak-Delivery-Program-Report.pdf>

⁵⁸ *Curbside Management Practitioners Guide*, 16.

⁵⁹ City of Toronto, *Curbside Management Strategy: Improving How Curbside Space is Used* (November 14, 2017), 8. <https://www.toronto.ca/legdocs/mmis/2017/pw/bgrd/backgroundfile-109153.pdf>

Prioritize curbside access for small zero-emission delivery vehicles

In some cases, small, nimble, zero-emissions delivery vehicles such as electric cargo vans and electric-assist or pedal-only cargo bikes can replace larger vehicles for last-mile delivery trips. Cargo vans and bikes take up less curbside space and are inherently safer than large delivery trucks because they have smaller blind spots and less inertia, making it easier for them to slow down and stop. New York City, for example, recently announced a program that would allow electric cargo bikes to park in existing commercial loading zones that are usually reserved for trucks and vans.⁶⁰ The program was implemented as part of New York City's efforts to improve road safety, tackle congestion, and reduce transportation GHG emissions.

5.3 Application to Edmonton

Ultimately, there are several curbside management solutions available to cities like Edmonton that are anticipating population growth and experiencing greater demand for curbside space. Additional stakeholder consultations and further studies are needed to understand curbside issues in the city and identify solutions that make sense in the Edmonton context. Failing to effectively manage curbside competition in the long term can result in increased congestion (and consequential economic costs), greater road safety risks, and poorer environmental and health outcomes due to increased cruising and idling activity.

⁶⁰ Winnie Hu and Matthew Haag, "Park It, Trucks: Here Come New York's Cargo Bikes," *New York Times*, December 4, 2019. <https://www.nytimes.com/2019/12/04/nyregion/nyc-cargo-bikes-delivery.html>

6. Low- and zero-emission vehicles

Low- and zero-emission vehicles (ZEVs) are vehicles that have the potential to produce zero or nearly zero tailpipe emissions. These include battery-electric vehicles, plug-in hybrid electric vehicles and hydrogen fuel cell vehicles.⁶¹ Recognizing the significant potential to reduce transportation related GHG emissions, the City of Edmonton demonstrated its leadership by being the first city in Alberta to release an electric vehicle strategy for passenger transportation. Globally, it is predicted that ZEV technological readiness in the freight sector will occur in phases, with urban delivery vans and small trucks electrifying in 2020, medium-duty freight vehicles in 2021, and heavy-duty regional freight vehicles in 2022.⁶²

Businesses are increasingly contemplating the use of alternative transportation modes and fuels for urban delivery trips to replace conventional fossil-fuel trucks. Cargo bikes, battery-electric vehicles, plug-in hybrid electric vehicles and hydrogen fuel cell vehicles are all being investigated and tested by goods-movement businesses. For example, UPS also has three key targets to achieve its emissions reduction goals from its global ground operations:

- By 2020, 25% of the vehicles that UPS purchases will employ alternative fuel or advanced technology.
- By 2025, 40% of all ground fuel will come from sources other than conventional fuels.

Similarly, Purolator notes that electric vehicles are a major part of its environmental commitment. In 2014, the company partnered with Unicell Limited to introduce the Quicksider prototype, the first fully electric delivery truck in the courier industry. As part of its five-year growth and innovation strategy, Delivering the Future, Purolator announced \$1 billion of investment into four key areas, one of which is to transform its fleet. The company plans to roll out its first wave of fully electric vehicles in 2020 to complement its existing fleet of hybrid electric vehicles.

⁶¹ Transport Canada, “Zero-emission vehicles.” <https://www.tc.gc.ca/en/services/road/innovative-technologies/zero-emission-vehicles.html>

⁶² Cristiano Façanha, “Accelerating the transition towards zero-emission urban freight vehicles,” presented at Cities Taking Freight Action, Toronto, March 3, 2020, 6. <https://www.pembina.org/docs/event/session-4-cristiano-facanha-calstart-r2.pdf>

This section discusses the issues that goods-movement stakeholders raised during interviews when asked about ways in which government can support their transition to near and zero-emission vehicles in Edmonton. It also highlights policy options to accelerate wide-scale adoption of these technologies. Consideration and further discussions are needed to examine the issues and applicability and feasibility of the practices outlined in this section as the City of Edmonton undertakes its long-term planning for an efficient, adaptive, and sustainable urban freight system. The solutions presented in this section may require various degrees of stakeholder engagement, feasibility studies, and support from other levels of government to be implemented successfully.

6.1 Interview findings

Key finding #8: The capital costs of certain low-carbon delivery technologies are barriers to adoption.

Businesses in the urban freight sector are increasingly interested in low-carbon delivery solutions to meet corporate sustainability goals and to reduce the environmental impact of their operations. Several businesses are making efforts to incorporate ZEVs into their delivery fleets or exploring ways to do so.

However, interviewees explained that the biggest barriers to adopting low-carbon delivery technologies, such as battery-electric vehicles and hydrogen fuel cell vehicles, are their high capital cost and the lack of charging/fueling infrastructure.^{63, 64} Cities can support businesses' efforts to integrate lower carbon modes and fuel types into their delivery fleets by providing the policies and infrastructure necessary to support their adoption.

Although there is a general sentiment among some businesses that the technology for low-carbon delivery vehicles is not yet ready, there is confidence that the technology is improving and that the freight industry is working towards decarbonization. Some interviewees said they are continuing to track the cost of ZEVs to evaluate whether and when to integrate these vehicles into their fleets. Interviewees also indicated their

⁶³ Ben Sharpe, Nic Lutsey, Cedric Smith and Carolyn Kim, *Power Play: Canada's Role in the Electric Vehicle Transition* (International Council on Clean Transportation, 2020), 14.

<https://www.pembina.org/reports/canada-power-play-zev-04012020.pdf>

⁶⁴ Interviewees did not comment on the costs of electric bikes or electric-assist cargo bikes. The interviews were conducted before the City of Edmonton announced (and then cancelled) its rebate program for electric vehicle chargers and e-bikes.

interest in seeing the City of Edmonton demonstrate leadership in freight decarbonization by hiring carriers that use low-carbon fleets or implement delivery operations that reduce emissions.

Key finding #9: Businesses need more information on the capabilities and the feasibility of electric-assist cargo bikes for commercial purposes.

Some businesses are testing or integrating cargo bikes into their delivery fleets in other Canadian cities (specifically, Vancouver, Montreal, and Toronto); however, there are a few examples of cargo bike delivery operations in Edmonton. When asked about cargo bikes, some interviewees were not familiar with the technology while others were concerned about how much weight a cargo bike could carry, whether there are theft issues when bikes are left unattended, and the feasibility of operating a cargo bike in inclement weather. Others recognized that cargo bikes have potential to operate in downtown Edmonton, but the idea is still in its infancy.

6.2 Practices in other jurisdictions

Electric vehicle strategies and government procurement

Montreal, Toronto and Vancouver as well as some municipalities in Alberta, including the cities of Calgary and Edmonton, have electric-vehicle strategies in place to support ZEV uptake and reduce GHG emissions from the transportation sector. These long-term strategies send important market signals to increase ZEV supply and demand and hold governments accountable to their commitments around vehicle electrification.

However, most of the supports that governments provide to encourage ZEV uptake, including financial and non-financial incentives, charging infrastructure, and consumer awareness campaigns, are targeted towards light-duty passenger vehicles. There is a lack of support for ZEV uptake in the commercial freight sector.

When designing an electric vehicle strategy to support ZEV adoption in the freight sector, it is important to consider the following:

- Accountability measures, including short- and medium- term actions to meet strategic goals, should be incorporated with articulated targets for greenhouse gas emission reductions over time. Performance indicators should be considered to evaluate progress and impact of actions.
- Strategies should increasingly include commitments towards electrification of light-, medium- and heavy- duty freight and goods movement vehicles.

- Strategies should include commitments to invest in infrastructure to support electrification, including charging-station installations. They should also include demonstration projects for the deployment and testing of zero-emissions goods-movement vehicles.
- ZEV strategies should be linked to other long-range plans such as goods movement and freight strategies, transportation and land use plans, and climate and clean energy plans.
- The governance structure should identify a government unit or individual responsible for coordination of the strategy, and identify governmental units responsible for implementation of actions in the strategy.⁶⁵

Municipalities can also demonstrate leadership in ZEV adoption by integrating these vehicles into their own fleets. The City of Vancouver currently has over 100 electric vehicles and over 50 hybrid or plug-in hybrid vehicles in its fleet. This includes 32 heavy-duty electric vehicles (Zambonis, utility vehicles, forklifts) and two medium-duty hybrid or plug-in hybrid electric refuse trucks. The City plans to own more than 200 electric vehicles as of 2021, including medium- and heavy-duty trucks such as tractor trailers, delivery vans and refuse trucks.⁶⁶

Procuring electric vehicles for the public-sector fleets demonstrates leadership and can stimulate the early electric vehicle market through mechanisms including increased model availability from industry, increased public visibility of electric vehicles, increased development of charging infrastructure and stimulation of related businesses and expertise.⁶⁷

Low-emission zones

To promote the use of low-carbon transportation modes and low-carbon fuels, low-emission zones (LEZ) have been implemented in several European cities.^{68, 69} Low-

⁶⁵ Vérificateur général de la Ville de Montréal, *2018 Annual Report: 4.3. Transportation Electrification Strategy* (2019), 131, 140. http://www.bvgmtl.ca/wp-content/uploads/2019/06/AR2018_En_Section4_3-1.pdf

⁶⁶ City of Vancouver, “Greening the City’s fleet.” <https://vancouver.ca/green-vancouver/green-fleets.aspx>

⁶⁷ International Energy Agency, *Global EV Outlook 2018* (2018), 96.

http://www.oecd.org/about/publishing/Corrigendum_GEVO2018.pdf

⁶⁸ Janelle Lee, Carolyn Kim, and Lindsay Wiginton, *Delivering Last-Mile Solutions: A feasibility analysis of microhubs and cyclelogistics in the GTHA* (Pembina Institute, 2019), 18.

<https://www.pembina.org/reports/delivering-last-mile-solutions-june-2019.pdf>

⁶⁹ Alison Conway, Pierre-Emmanuel Fatisson, Penny Eickemeyer, Jialei Cheng and Diniece Peters, “Urban micro-consolidation and last mile goods delivery by freight-tricycle in Manhattan: Opportunities and

emission zones are highly effective at reducing GHG and criteria air contaminants from municipal transport but are complicated to implement from a regulatory perspective, and require high levels of buy-in from a variety of stakeholders including businesses, fleets, transit authorities, and the general public.⁷⁰

The LEZ and ultra-low emission zone (ULEZ) in London, England, are perhaps the most well known. Under the city's LEZ, heavy goods vehicles, trucks, vans, buses, coaches, minibuses and other specialist diesel vehicles driving within Greater London are required to pay a daily charge.⁷¹ Under the ULEZ, all vehicle types driving within the central London area are subject to an additional daily fee if they do not meet the emissions standard. A charge of £12.50 (approximately \$21 Cdn) is applied to most vehicle types (e.g. cars, van, and motorcycles) under 3.5 tonnes and a £100 charge (approximately \$170 Cdn) is applied to heavier vehicles (e.g. trucks over 3.5 tonnes) that do not meet European ULEZ emissions standards.⁷² Prohibiting or disincentivizing the use of larger polluting vehicles through LEZs, ULEZs, or similar vehicle access restrictions encourages businesses to integrate smaller and less-polluting vehicles into their delivery fleets.

There is a growing appetite for similar policies in the United States. Santa Monica, California recently announced that it is looking to pilot a voluntary zero-emissions delivery zone in a one-square-mile area in the city's core commercial district.⁷³ The aim of the pilot is to encourage the use of delivery technologies such as e-cargo bikes and light- and medium-duty electric vehicles to decrease congestion, improve curbside management, and reduce pollution. The city is also interested in implementing data collection and monitoring tools to track pollution, congestion, and other metrics.

Since ZEV uptake is still quite low in North America, an LEZ that does not permit internal combustion engine vehicles would effectively be a car ban.⁷⁴ As such, LEZs have not been widely adopted in North America. In Canada, Laval, Quebec, has successfully

challenges,” in *Proceedings of the 91st Transportation Research Board Annual Meeting, Washington, DC, USA, 22–25 January 2012*, 9–10.

⁷⁰ Delphi Group and Pollution Probe, *Opportunities for Low-Carbon Mobility Actions in Canadian Municipalities: Best Practices and Guidance* (2020), 28.

⁷¹ City of London, “Low Emission Zone.” <https://tfl.gov.uk/modes/driving/low-emission-zone>

⁷² City of London, “Ultra Low Emission Zone.” <https://tfl.gov.uk/modes/driving/ultra-low-emission-zone>

⁷³ Chris Teale, “Santa Monica, CA to pilot zero emissions delivery zone,” *Smart Cities Dive*, June 17, 2020. <https://www.smartcitiesdive.com/news/santa-monica-LACI-pilot-voluntary-zero-emissions-delivery-zone/579937/>

⁷⁴ *Opportunities for Low-Carbon Mobility Actions in Canadian Municipalities*, 28.

implemented a low-emission zone⁷⁵, but other jurisdictions are only at the stage of exploring and considering the possibility of LEZs:

- The City of Vancouver's Climate Emergency Response report recommended engagement on zero-emissions areas that would deter or restrict access by combustion engine vehicles with a goal of encouraging ZEV adoption, including in goods movement.⁷⁶
- The City of Toronto's EV Strategy recommended a pilot project zone for low-emission or zero-emission vehicles.⁷⁷

Delivery taxes

A tax on goods purchased online is potentially another method to encourage low-carbon delivery operations. To date, France has been the only jurisdiction to put forward a proposal to tax goods purchased on e-commerce sites. The proposal has been submitted by the French Senate and if accepted, would result in a percentage-based tax rate that is scaled to the distance a particular good has travelled from warehouse to final destination.⁷⁸ Goods will be taxed 1% of their final price for delivery distances less than 50 km, 1.5% for distances between 50 to 80 km and 2% for distances greater than 80 km with a minimum tax of €1.00 per online order. The initial proposal of the tax was not percentage-based and had a minimum tax of €3.00 per online order with an additional €0.50 per km travelled.⁷⁹

Though the proposed tax does not reflect speed of delivery, it takes into consideration the mode of travel. In particular, deliveries made using modes that do not consume fossil energy would be exempt from the tax.⁸⁰ This would include, for instance, electric vehicles, hydrogen fuel cell vehicles, internal combustion engine vehicles operating using biofuels, and active modes of transportation, such as cargo cycles. Though the tax

⁷⁵ *Opportunities for Low-Carbon Mobility Actions in Canadian Municipalities*, 14.

⁷⁶ City of Vancouver, *Report – Climate Emergency Response* (2019), Appendix A p. 3. <https://council.vancouver.ca/20190424/documents/cfsc1.pdf>

⁷⁷ City of Toronto, *City of Toronto Electric Vehicle Strategy: Supporting the City in achieving its TransformTO transportation goals* (2019), 37. <https://www.toronto.ca/wp-content/uploads/2020/02/8c46-City-of-Toronto-Electric-Vehicle-Strategy.pdf>

⁷⁸ Senate of France, *Proposition de Loi Portant Pacte National de Revitalisation des Centres-Villes et Centres-Bourgs*, June 14, 2018, Article 27, 45. <https://www.senat.fr/leg/tas17-125.pdf>

⁷⁹ Senate of France, *Proposition de Loi Portant Pacte National de Revitalisation des Centres-Villes et Centres-Bourgs*, April 20, 2018, Article 27, 93-94. <https://www.senat.fr/leg/ppl17-460.pdf>

⁸⁰ *Proposition de Loi Portant Pacte National de Revitalisation des Centres-Villes et Centres-Bourgs*, April 20, 2018, Article 27, 93-94.

would be charged annually to the e-commerce site, the Finance Committee of the Senate has expressed concern that the cost of the tax would be easily passed on to consumers and would lead to inequalities across regions.⁸¹

There is some evidence to suggest that a distance-based tax on trucks transporting goods would lead to minimal GHG emission benefits and may in fact be counterproductive. One study finds that a tax on truck distance travelled may reduce the demand for goods purchased on e-commerce sites and erode the GHG emission benefits offered by consolidated goods distribution.⁸² Ultimately, the net effect of taxing truck distance on total GHG emissions is inconclusive.

Cargo bike pilots and initiatives

Cities and businesses are increasingly interested in testing cargo bikes for last-mile delivery trips as a way to increase delivery efficiency, reduce freight emissions, reduce curbside competition, and improve road safety by decreasing interactions between trucks and vulnerable road users. UPS, for example, piloted a cargo bike in 2017 to deliver packages in and around York University campus in Toronto.⁸³ Research also shows that using cargo bikes for deliveries is more cost effective than conventional delivery trucks/vans when deployed in areas with high population density.^{84, 85}

As seen in the examples below, municipalities play an important role in supporting cargo bike deliveries:

- The City of Montreal has implemented a cargo bike delivery pilot called “Project Colibri” in the city’s downtown core. The City has provided an old bus depot to be used as a consolidation space and transhipment point for delivery trucks to

⁸¹ Arnaud Bazin, on behalf of the Finance Committee, *Avis Présenté au Nom de la Commission des Finances (1) sur la Proposition de Loi Portant Pacte National de Revitalisation des Centres-Villes and Cetres-Bourgs*, June 5, 2018, 103. <https://www.senat.fr/rap/a17-543/a17-5431.pdf>

⁸² Kenneth Carling, Johan Hakansson, Xiangli Meng and Niklas Rudholm, “The Effect on CO2Emissions of Taxing Truck Distance in Retail Transports,” *Transportation Research Part A* 97 (2017) 54.

⁸³ UPS, “UPS Launches Cargo Bike in Canada,” media release, October 31, 2017. <https://www.ups.com/ca/en/about/news/cargo-bikes.page>

⁸⁴ Carine Choubassi, Dan P.K. Seedah, Nan Jian and C. Michael Walton, “Economic Analysis of Cargo Cycles for Urban Mail Delivery,” *Transportation Research Record: Journal of the Transportation Research Board No. 2547* (2016).

⁸⁵ Manali Sheth, Polina Butrina, Anne Goodechild and Edward McCormack, “Measuring delivery route cost trade-offs between electric-assist cargo bicycles and delivery trucks in dense urban areas,” *European Transport Research Review* (2019).

unload and transfer packages onto cargo bikes.⁸⁶ As noted in Section 4, a centrally located consolidation space is an essential part of the success of cargo bike delivery operations.

- The City of Toronto recently passed a motion at its Infrastructure and Environment Committee meeting⁸⁷ which included recommendations for city staff to propose a new regulatory framework for e-bikes and e-cargo bikes, recognizing that greater regulatory clarity and consistency are needed to support their use (particularly when it comes to commercial deliveries). The committee also voted to remove a weight limit on pedal-assist e-bikes that restricts their use on physically separated bikeways. By removing this weight restriction, pedal-assist cargo bikes can better utilize Toronto's cycling network. Toronto's City Council adopted the recommendations in July 2020.⁸⁸
- New York City recently announced a program that would allow electric cargo bikes to park in existing commercial loading zones that are usually reserved for trucks and vans.⁸⁹

In addition to municipal governments, local business communities and associations can play an important role in supporting the use of cargo bikes for last-mile deliveries. Team London Bridge, for example, is a business improvement district in London, England that works with and supports over 400 of its business members.⁹⁰ Through its "Bikes for Business" initiative, Team London Bridge helps its business members use cargo bikes for deliveries rather than motorized vehicles.⁹¹ More specifically, Team London Bridge helps businesses by:

- Identifying which existing motorised deliveries can be substituted with a bike service
- Recommending a specific cargo bike operator that is best suited for a business
- Offering subsidies to help offset the initial cost of transitioning from motorized to bike deliveries

⁸⁶ Katelyn Thomas, "Ville-Marie pilot project to use electric cargo bikes for deliveries," Montreal Gazette, August 8, 2019. <https://montrealgazette.com/news/local-news/ville-marie-pilot-project-to-use-electric-cargo-bikes-for-deliveries>

⁸⁷ City of Toronto, *IE14.11: Regulatory Clarity for E-Cargo Cycles* (2019).
<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2020.IE14.11>

⁸⁸ City of Toronto, Regulatory Clarity for E-Cargo Cycles, IE14.11, July 28, 2020.
<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2020.IE14.11>

⁸⁹ Winnie Hu and Matthew Haag, "Park It, Trucks: Here Come New York's Cargo Bikes," *New York Times*, December 4, 2019. <https://www.nytimes.com/2019/12/04/nyregion/nyc-cargo-bikes-delivery.html>

⁹⁰ Team London Bridge, "What We Do." <https://www.teamlondonbridge.co.uk/about-us>

⁹¹ Team London Bridge, "Bikes for Business." <https://www.teamlondonbridge.co.uk/bikesforbusiness>

- Assisting businesses throughout the process as part of a monitored pilot program.

The Team London Bridge example demonstrates that cargo bike deliveries can not only provide environmental benefits but can bolster local economic development by supporting local businesses with their delivery operations and providing work to local cargo bike courier companies.

6.3 Application to Edmonton

The City of Edmonton has already taken a number of steps towards some of these low-emission vehicle initiatives.

The City has issued a tender for light-duty vehicles which includes an ask for EVs, and its EV strategy includes continued electrification of its municipal fleet as a strategic objective.^{92, 93}

Although the City of Edmonton does not have specific plans to implement LEZs, its Draft City Plan includes policy statements such as “Enable a comprehensive and adaptive urban freight environment to serve goods movement, services and delivery while mitigating negative community, environmental and safety impacts,” and “Support a low carbon mobility system.”⁹⁴ Such policy directives provide the flexibility to consider and support solutions such as LEZs.

Tax policies can also be used as a way to raise funds to pay for further emission-reduction investments and programs, but these policies are not always available to municipalities. The City of Edmonton conducted a comprehensive review of the funding options available to advance the energy transition.⁹⁵

The City of Edmonton has acknowledged the potential of cargo bikes for last-mile deliveries in their Draft City Plan, noting that such a solution could help “make urban deliveries more efficient and potentially reduce congestion, emissions and curbside

⁹² City of Edmonton, *Edmonton’s Electric Vehicle Strategy* (2018), 17-18.

https://www.edmonton.ca/city_government/documents/PDF/EdmontonElectricVehicleStrategy.pdf

⁹³ *Edmonton’s Electric Vehicle Strategy*, 57-58.

⁹⁴ *Draft Edmonton City Plan*, 75-76.

⁹⁵ City of Edmonton, *Energy Transition Funding Options*.

https://www.edmonton.ca/city_government/documents/PDF/EnergyTransitionFundingOptions.pdf

management issues.”⁹⁶ The City recently cancelled its e-bike rebate because it was perceived as gift for the rich who can afford e-bikes⁹⁷ at a time when a significant portion of the population was receiving the Canada Emergency Response Benefit. Those rebates could be repurposed for cargo bikes that are used only for delivery operations. This measure would significantly increase the awareness of Edmonton businesses of cargo bikes while supporting their economic recovery.

The practices presented here can be built on the work that the City started with its published Electric Vehicle Strategy and Draft City Plan. Moreover, in March 2020, the City of Edmonton attended and presented at the Pembina Institute’s *Cities Taking Freight Action Forum*.⁹⁸ This event connected the City with other Canadian cities and businesses it can learn from and collaborate with. Some of the practices presented here will require close collaboration with the provincial government.

⁹⁶ *Draft Edmonton City Plan*, 129.

⁹⁷ Natasha Riebe, “Edmonton backpedals on e-bike rebate program,” CBC News, June 29, 2020.
<https://www.cbc.ca/news/canada/edmonton/edmonton-city-council-covid-19-e-bike-rebate-1.5632252>

⁹⁸ Pembina Institute, “Cities Taking Freight Action: A Canadian urban freight forum.”
<https://www.pembina.org/event/cities-taking-freight-action>

7. Urban freight data collection

Data collection and analysis of commercial vehicle movements are crucial to understanding existing and forecasted goods-movement demand and adequately planning the needs of Edmonton and surrounding regions. Both the City of Edmonton's Transportation Master Plan, *The Way We Move*, and the Goods Movement Strategy include strategic actions to conduct surveys of goods and services movements, taking consideration of the use of electronic data-gathering technologies and industry GPS data, to understand the travel patterns within the city and region.^{99, 100}

The City of Edmonton has periodically conducted roadside truck surveys to collect information on trip origins and destinations, routes taken while travelling in the city and regional highways, commodities carried, and experiences while travelling on the Edmonton transportation network.¹⁰¹ However, previous surveys have been limited to trucks with a gross vehicle weight of 4,500 kg or more (e.g. pick-up trucks with a trailer, single unit trucks, single trailers, and multi-unit trailers). Lighter delivery vehicles, such as cargo vans or courier trucks/package cars, which are common for last-mile delivery trips, were not included.¹⁰² In other words, the City has limited data to understand last-mile delivery activity in Edmonton and inform solutions to manage this aspect of urban freight.

One of the challenges with such surveys is that they can be expensive and lengthy to conduct and the data provides only a static snapshot of freight activity. Nevertheless, they are a powerful long-term planning tool especially when surveys are conducted frequently and consistently. The City's truck surveys can be improved by expanding their scope beyond large trucks to include lighter delivery vehicles, such as cargo vans or step-thru trucks. It is also useful to collect data to understand activities specific to urban delivery trips, such as finding curbside loading space.

⁹⁹ City of Edmonton, *The Way We Move: Transportation Master Plan* (September, 2009), 81.

https://www.edmonton.ca/city_government/documents/land_sales/TransportationMasterPlan.pdf

¹⁰⁰ City of Edmonton, *Edmonton Goods Movement Strategy* (June 2014), iii.

https://www.edmonton.ca/city_government/documents/PDF/CoE_GMS_Report_2014_CR_931_WEB.pdf

¹⁰¹ City of Edmonton, *Roadside Truck Survey* (2013), 5.

https://www.edmonton.ca/transportation/PDF/Roadside_Truck_Survey_Summary_Report_Feb_2013.pdf

¹⁰² City of Edmonton, *Roadside Truck Survey* (2013), 10.

https://www.edmonton.ca/transportation/PDF/Roadside_Truck_Survey_Summary_Report_Feb_2013.pdf

Consideration and further discussions are needed to examine the issues and applicability and feasibility of the practices outlined in this section as the City of Edmonton undertakes its long-term planning for an efficient, adaptive and sustainable urban freight system.

7.1 Interview findings

Key finding #10: There may be opportunities to leverage data collected by the private sector to supplement the City of Edmonton's roadside truck surveys.

Several interviewees said they collect data on their delivery operations; however, this data is rarely made public or available to transportation and city planners since it is often sensitive and competitive information. Businesses indicated they collect data including metrics such as:

- weight of goods transported per route
- volume of deliveries made within a given service area
- number and frequency of delivery trips
- delivery time
- on-time delivery success rates
- types of clients
- types of turns made on delivery routes
- idling activity
- route efficiency

There may be opportunities for the City to work with industry to leverage the data that businesses are already collecting. Given that there are sensitivities with data sharing, further conversations are needed between government and industry to explore these opportunities, including if and how data should be shared, used, and communicated.

7.2 Practices in other jurisdictions

Data collection partnerships

Other jurisdictions are starting to collect and analyze data on curbside use in real time to inform how cities can better manage delivery activity and curbside access for goods movement vehicles. Washington, D.C., for example, is partnering with curbFlow, a mobility company that coordinates commercial operator pickup and drop-off activity at

available curb space in real time.¹⁰³ As part of this initiative, curbFlow is collecting and analyzing data on the demand for curbside use by commercial vehicles.

In partnership with the Seattle Department of Transportation, the Urban Freight Lab at the University of Washington conducted a data collection project in Seattle to understand and determine the time associated with each activity required in the “final 50 feet” of a delivery trip (e.g. parking the delivery vehicle, unloading items from the vehicle, waiting for the elevator in a high-rise commercial/residential building, getting the customer’s signature, etc.).¹⁰⁴ One of the delivery locations that was studied during this project was the Seattle Municipal Tower. It was found that “of the 20 total minutes delivery drivers spent on average in the Seattle Municipal Tower, 12.2 of those minutes were spent going floor-to-floor in freight elevators and door-to-door to tenants on multiple floors.”¹⁰⁵

Based on this data, the Seattle Department of Transportation in partnership with the Urban Freight Lab piloted a parcel locker system in the Seattle Municipal Tower to reduce delivery times and therefore truck dwell times (i.e. the time that a delivery truck remains stopped or parked outside a building). The pilot project reduced delivery times in the Seattle Municipal Tower by 78% when compared to business-as-usual operations.¹⁰⁶ This is an example of how data collection and analysis are important to informing the kinds of solutions that cities can implement to better manage urban freight activity.

7.3 Application to Edmonton

As the City of Edmonton observed in other areas of its Community Energy Transition Strategy, data is key to informing the right adaptation of policy ideas to the local context. Partnerships with industry could enable access to data that will inform future urban freight policies and broader urban planning.

¹⁰³ District Department of Transportation, “DDOT Announces Next Innovation in Curbside Management Program,” media release, June 24, 2019. <https://ddot.dc.gov/release/ddot-announces-next-innovation-curbside-management-program>

¹⁰⁴ Urban Freight Lab, University of Washington, *The Final 50 Feet Urban Goods Delivery System: Research Scan and Data Collection Project* (2018), 30-31.

https://depts.washington.edu/sctlctr/sites/default/files/SCTL_Final_50_full_report.pdf

¹⁰⁵ *The Final 50 Feet Urban Goods Delivery System*, 3.

¹⁰⁶ *The Final 50 Feet Urban Goods Delivery System*, 4.

8. Recommendations

The City of Edmonton has taken steps to reduce greenhouse gases for its own operations and the whole community. When it comes to transportation, the City has made progress in decarbonizing passenger travel and there are many opportunities for the City to deepen its efforts to decarbonize urban freight activity. Many of the urban freight solutions discussed in this report not only help achieve carbon reductions but also help businesses increase last-mile delivery efficiency and mitigate the impacts of goods movement on our cities (e.g. congestion, noise, and curbside competition).

Based on the scan of practices that different jurisdictions are exploring or implementing to manage and decarbonize urban freight activity, this report recommends tactics and next steps that the City of Edmonton can take to examine the issues, challenges and potential solutions raised by urban freight stakeholders.

Recommendation 1: Conduct an urban freight study, which includes stakeholder engagement and data collection, to understand urban freight operations and industry needs, trends, and challenges. The study should focus on light- and medium-duty trucks and smaller delivery vehicles that are common for last-mile deliveries.

To date, many of the City's strategic objectives and approaches to managing freight focus on improving medium and heavy-duty truck movements. There has been limited examination of last-mile delivery activity in Edmonton and few policies exist to plan for and manage this aspect of urban freight. In order to deepen the City's understanding of urban freight operations and industry needs, trends, and challenges, the City should conduct an urban-freight specific study that focuses on light- and medium-duty trucks and smaller delivery vehicles that are commonly used for last-mile deliveries.

As part of this study, the City should engage urban freight stakeholders to deepen its understanding of urban freight issues in Edmonton and the types of solutions that are needed. Interviewees expressed a strong desire to be consulted by the City of Edmonton on urban freight issues more often. The City should also consult urban freight stakeholders on other transportation matters that are not directly related to goods movement, such as cycling, transit expansion, and road construction, as decisions related to these issues can affect goods-movement operations. The Pembina Institute's

Urban Delivery Solutions Initiative¹⁰⁷ is an example of a stakeholder group that the City of Edmonton can engage in this work.

Another component of this urban freight study should focus on curbside management. In order to effectively manage curbside competition both now and in the future, the City of Edmonton requires a deeper understanding of different curbside uses in the city, particularly in the downtown, and the challenges that different curbside users face. Urban freight stakeholders interviewed for this report said that finding curbside loading space is one of the biggest challenges to delivering goods in Edmonton. Furthermore, short-term parking and loading will continue to be issues in the city as more delivery vehicles require curbside access to keep up with growing delivery demand. A curbside study, including data collection on metrics such as parking/loading duration and turnover, double-parking incidents, and number and frequency of different curbside users at different locations, will help the City understand the curbside management challenges that need to be addressed.

To collect curbside-related data, the City should consider partnering with a curbside data collection company, similar to the way in which Washington, D.C. is working with curbFlow to collect and analyze data on curbside demand from commercial vehicles (Section 7.2). There may also be opportunities for the City to leverage data that many goods movement businesses already collect. However, given that businesses are reluctant to share such information, further conversations are needed between government and industry to explore these opportunities, including if and how data should be shared, used, and communicated. A data sharing agreement or data trust may need to be established to clarify these terms and conditions.

Recommendation 2: Informed by technical studies on urban freight activities, update the Edmonton Goods Movement Strategy to plan for and manage the growing impact of and changes to urban freight activity in the city.

Data and other findings gathered from the urban freight study described in Recommendation 1 can be used to inform how the Edmonton Goods Movement Strategy should be updated to address urban freight challenges. Incorporating urban freight into future versions of the Goods Movement Strategy will complement existing work that focuses on heavy-duty trucking to provide a more holistic approach to goods movement planning in Edmonton.

¹⁰⁷ Pembina Institute, “Urban Delivery Solutions Initiative.” <https://www.pembina.org/UDSI>

Recommendation 3: Building on Edmonton's electric vehicle strategy, develop a long-term electric vehicle strategy for commercial freight vehicles.

Although the City of Edmonton has an electric vehicle strategy in place, it focuses on the electrification of light-duty passenger vehicles. There is a lack of support for ZEV uptake in the commercial freight sector. A strategy to support ZEV adoption in the freight sector should consider the following:

- Accountability measures including short- and medium-term actions to meet strategic goals with articulated targets for greenhouse gas emissions reductions over time. Performance indicators should be considered to evaluate progress and impact of actions.
- Strategies that increasingly include commitments towards electrification of light-, medium- and heavy-duty freight and goods-movement vehicles.
- Strategies that include commitments to invest in infrastructure to support electrification, including charging station installations specific to the needs of commercial delivery vehicles. They should also include demonstration projects for the deployment and testing of zero-emission goods-movement vehicles.
- ZEV strategies linked to other long-range plans such as goods movement and freight strategies, transportation and land use plans, and climate and clean energy plans.
- A governance structure that identifies a government unit or individual responsible for coordination of the strategy, and identification of governmental units responsible for implementation of actions in the strategy.

Recommendation 4: Integrate tactics to decarbonize urban freight activity into the City's forthcoming Community Energy Transition Strategy as part of the second climate shift on "Low carbon city and zero emissions transportation"

In 2019, city council voted to update the Energy Transition Strategy to align with the international target recommended by the UN Intergovernmental Panel on Climate Change: keeping the increase in global average temperatures under 1.5 degrees Celsius compared with the pre-industrial era. In preparation for the strategy update, the City identified seven groups of measures, called "climate shifts", that it must take to avoid overspending its carbon budget of 155 Mt of CO₂e between 2017 and 2050. One of these climate shifts is "Low carbon city and zero emissions transportation." As part of this climate shift, the City of Edmonton should consider the suggested tactics in Table 2 below.

Table 2: Recommended tactics for a low-carbon transportation system for Edmonton's Community Energy Transition Strategy

Climate Shift #2: Low-carbon city and zero-emissions transportation Opportunity Area: Urban freight	
1)	Work with businesses in the urban freight sector to implement delivery models that improve last-mile delivery efficiency <ul style="list-style-type: none"> a) Explore opportunities to partner with courier businesses to establish a microhub and cargo bike delivery pilot in downtown Edmonton b) Explore opportunities to partner with courier businesses to establish a common carrier parcel locker system in municipal office buildings c) Investigate zoning bylaws that could require common carrier parcel lockers in high-density residential or commercial buildings
2)	Evaluate and implement curbside management solutions to reduce cruising activity caused by curbside competition <ul style="list-style-type: none"> a) In consultation with key stakeholders, identify potential locations in the city, particularly in the downtown, that can be converted into designated courier loading zones or delivery staging zones b) Conduct a feasibility study on freight-zone pricing to understand the costs and benefits to urban freight businesses c) Investigate the need for and benefits of off-peak deliveries
3)	Evaluate and provide the policies and infrastructure needed to help businesses adopt low- and zero-emission vehicles into their delivery fleets <ul style="list-style-type: none"> a) Develop an electric vehicle strategy to support commercial procurement and use of electric urban freight vehicles b) Establish a government procurement policy that requires the City to hire carriers that use low-carbon fleets or have implemented delivery operations to reduce emissions c) Explore the feasibility and efficacy of a low-emissions zone in Edmonton and identify the most suitable locations for a low-emissions zone d) Explore the feasibility and efficacy of an e-commerce tax on items delivered by fossil-fueled vehicles to encourage businesses to adopt zero-emission fleets

9. Conclusion

Urbanization and the growth of e-commerce have put tremendous pressure on cities to manage and decarbonize increased urban freight activity. At the same time, issues such as traffic congestion, curbside competition, and increasing delivery demand are making it more challenging for businesses to deliver goods in cities. The COVID-19 pandemic has underscored the importance of urban freight. Goods movement is critical to ensuring that households, hospitals, and other organizations are receiving essential items, including food and medical supplies. As such, it is important that municipalities understand the intricacies of moving and delivering goods in a city, and that they work with businesses to decarbonize and prepare for changes in the way people shop and receive items.

Through its Goods Movement Strategy and other transportation and freight-related studies, the City of Edmonton acknowledges the importance of freight to its economy and the quality of life of its residents. However, many of the City's existing strategic objectives and approaches to managing freight focus on improving heavy-duty truck movements to major industrial areas in the surrounding areas. There has been limited examination of last-mile delivery activity within Edmonton and few policies exist to plan for, manage, and decarbonize this aspect of urban freight. The City of Edmonton's update of its Community Energy Transition Strategy is an excellent opportunity to set a pathway towards meaningful emissions reduction in urban freight while exploring and implementing solutions to address urban freight challenges in the city.

Through stakeholder interviews and findings from a jurisdictional scan of urban freight practices, this report shows there are many opportunities for the City of Edmonton to deepen its understanding of urban freight issues within the city and to work with industry stakeholders to test and adopt solutions to address these challenges. Ultimately, the recommendations in this report can bolster the City's efforts to achieve a 1.5°C pathway while strengthening its economy through a more efficient and sustainable goods-movement system.

Appendix A. Interview questions

The Pembina Institute interviewed nine businesses in the urban freight sector in Edmonton. Interviewees included courier companies, freight transportation and logistics service providers, and grocery delivery companies, and business associations.

Delivery operations

- How does your business currently handle goods movement in the city?
 - Does your business conduct its own deliveries or use a third-party logistics/delivery company?
 - How is the last-mile segment of delivery trips conducted? (Where are goods shipped from before arriving to the customer? What type of delivery vehicles are used?)
 - Are there specific times of day that deliveries occur?
- What are your business' main priorities when delivering goods in the city? (e.g. on-time delivery, maximizing consolidation potential, reducing vehicular emissions from delivery vehicles)
- What are the biggest challenges that your business faces when delivering goods in Edmonton? (e.g. trip planning, delivery costs, unreliability of time due to congestion, increasing shipping demands, missed deliveries, finding parking/loading zones in dense areas, safety concerns when delivery vehicles interact with other road users)
- What kinds of support from government would you like to see in order to improve urban freight operations?
- What are some of the measures that the City of Edmonton has taken that generated opportunities or challenges to your business?

Industry trends

- How has your business changed with the rise of e-commerce? How have your delivery operations changed?
- Are there specific tactics that your business is implementing to respond to changing consumer shopping preferences?
- What other trends are impacting the way your business conducts deliveries in the city?

Innovation

- Are there innovative delivery methods that your business is interested in testing or adopting (e.g. delivery by cargo cycle, micro-consolidation, delivery robots and drones, electrifying delivery fleets)?

Goods movement data

- What kind of data, if any, does your business collect on its urban freight activity? (e.g. number and frequency of delivery trips, volume of deliveries made within a given service area, delivery time)

Disruptions from COVID-19

- What goods-movement related challenges have emerged due to the pandemic (e.g. facilitating curbside pick-up, businesses needing access to third-party delivery services in order to fulfill e-commerce orders as more people buy things online)?
- What kinds of solutions are you implementing to overcome these challenges?
- Has the City of Edmonton implemented any measures that have helped address these challenges and what are some measures that you would like to see implemented by the City?
- What do you think will be the long-term impacts of the pandemic on local businesses and how they get products to customers?

Not all questions applied to all interviewees.