

Report Part Title: Urban delivery operations

Report Title: Moving Edmonton to efficient, low-carbon, urban freight delivery

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

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Published by: Pembina Institute (2020)

Stable URL: <https://www.jstor.org/stable/resrep28300.7>

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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 transshipment 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.