Calgary Cyclelogistics

Unlocking the potential for cargo bike delivery

August 2025

Hongyu Xiao , Chandan Bhardwaj, Nafisa Nawal

PEMBINA Institute

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Hongyu Xiao

Chandan Bhardwaj, Nafisa Nawal

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The Pembina Institute
#802, 322 – 11 Avenue SW
Calgary, AB T2R 0C5
403-269-3344

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These acknowledgements are some of the beginning steps on a journey of several generations. We share them in the spirit of truth, justice, reconciliation, and to contribute to a more equitable and inclusive future for all of society.

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Executive summary

Freight traffic is increasing in cities across Canada, driven in part by the rise of online shopping. As more delivery trucks and vans travel through metropolitan areas, they contribute to air and noise pollution, traffic congestion and greenhouse gas emissions, and can pose safety risks to other road users. To improve the efficiency and sustainability of urban goods movement, cities and businesses are exploring alternatives such as the delivery of goods by bike. This approach, often referred to as "cyclelogistics," includes the use of pedal-powered or electric-assist bicycles, tricycles and other multi-wheeled cycles.

This report examines the potential for cyclelogistics in the City of Calgary. Drawing on research, interviews and lessons from other jurisdictions, it identifies strategies the City can use to enable and expand cargo bike delivery as a more sustainable freight solution. While the focus of this report is on cargo e-bike adoption, supportive infrastructure and policies would also benefit pedal-powered cargo bikes and other forms of micromobility, creating broader system benefits.

Key findings

- Businesses recognize that cargo e-bikes could serve as an effective last-mile delivery option for busy downtown routes — provided there is sufficient infrastructure, supportive policies and a clear business case.
- Calgary already has a well-developed bike lane network in the core, but enhancements are needed to support cargo e-bikes — including wider lanes, charging stations and dedicated parking.
- Key barriers to adoption include Calgary's expansive geography, limited bike infrastructure in outer neighbourhoods, harsh winter conditions, a lack of financial or policy support and limited awareness of cargo e-bikes.

Recommendations

Based on our analysis, we recommend six key actions the City of Calgary can take to support cyclelogistics:

1. Support business development of cyclelogistics hubs
2. Expand cycle infrastructure and reevaluate design guidelines
3. Create cargo e-bike sharing programs in business improvement areas
4. Start a cargo e-bike pilot program

5. Facilitate cyclelogistics awareness and knowledge building campaigns
6. Amend bylaws and regulations to facilitate cargo e-bike operations

Together, these actions can help Calgary lay the groundwork for a robust cyclelogistics network, one that aligns with the City's transportation and climate goals while improving quality of life in urban neighbourhoods.

1. Introduction

The transportation sector accounts for approximately 34% of greenhouse gas (GHG) emissions in Calgary, with on-road freight responsible for roughly 62% of transportation emissions across Alberta.[1] As e-commerce continues to grow, urban delivery vehicles are becoming increasingly common in neighbourhoods and city centres. Between 2019 and 2025, online sales surged and have remained well above pre-pandemic levels — suggesting a lasting shift in consumer behavior.

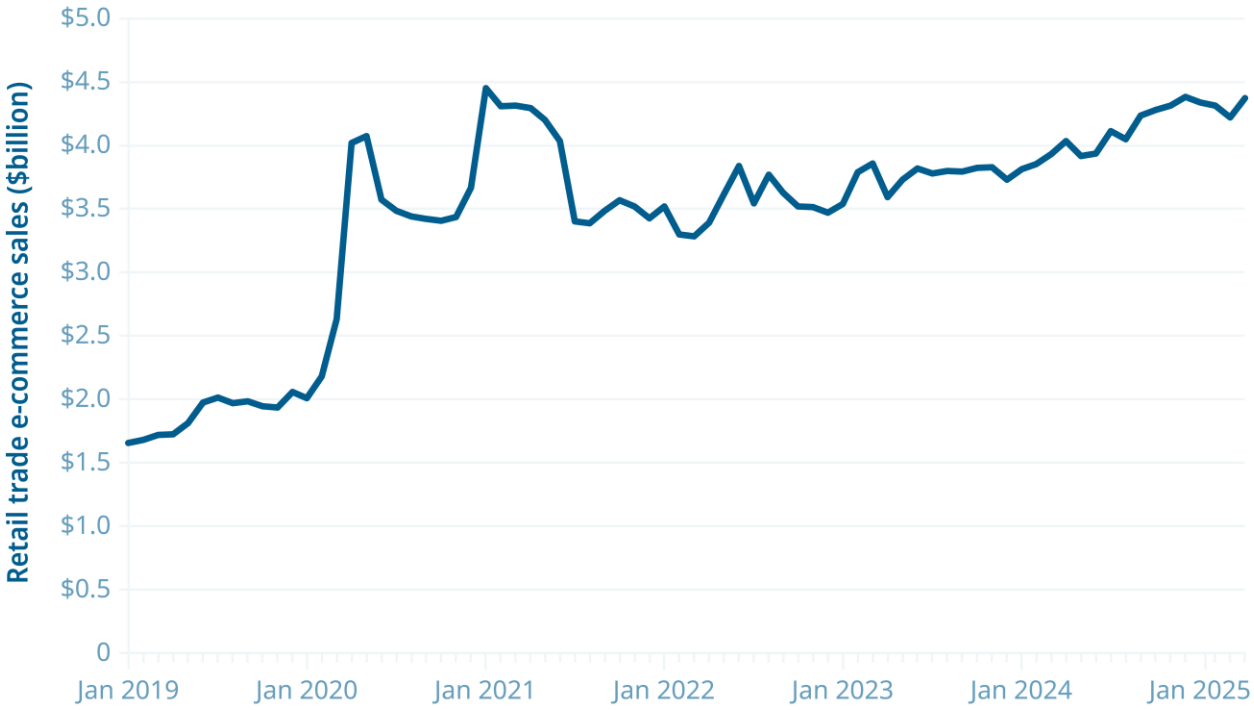

Figure 1. Trends in retail e-commerce sales

Data source: Statistics Canada[2]

This growing demand for urban deliveries, combined with ongoing urbanization, is expected to increase the number of delivery vehicles on city streets — contributing to degraded air quality, traffic congestion, noise and road safety concerns and higher emissions. Diesel trucks are a major sources of pollutants like nitrogen oxides and fine particulate matter (PM2.5), which are linked to serious health outcomes including cardiovascular and respiratory diseases, and

[1] Office of Energy Efficiency at Natural Resources Canada, "Transportation Sector – Alberta," *Comprehensive Energy Use Database*, Table 8: GHG Emissions by Transportation Mode, 2024. https://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/showTable.cfm?type=CP&sector=tran&juris=ab&rn=8&year=2021&page=0

[2] Statistics Canada, "Monthly retail trade e-commerce sales (x 1,000)," Monthly Retail Trade Survey, Table 20-10-0056-03, 2025. https://doi.org/10.25318/2010005601-eng

premature death. In 2015, Health Canada estimated that traffic-related air pollution was responsible for 2 premature deaths per 100,000 people in Calgary and its surrounding region.[3]

Despite these impacts, the movement of goods remains critical to the economy. In 2024, the transportation and warehousing sector employed approximately 144,400 people in Alberta, reaching a 10-year high,[4] and contributed nearly 6% to the Calgary region's GDP, or $6.67 billion, in 2023.[5] More than 120,000 truck trips occur daily in Calgary, and truck traffic increased by over 55% between 1996 and 2021.[6] Calgary International Airport handles 75% of Alberta's air cargo and is Canada's second-busiest airport for air freight.[7]

To meet the growing demand for goods movement while reducing its negative impacts, cities are exploring more sustainable delivery methods. One emerging solution is cyclelogistics — the use of bicycles, tricycles, and other multi-wheeled cycles to transport goods. By shifting a portion of deliveries from trucks to bikes, cities can reduce the distance travelled by trucks and vans, along with associated emissions, congestion, and other urban freight impacts. Cargo e-bikes also offer operational advantages such as avoiding traffic congestion and more flexible parking.

Currently, cargo e-bike delivery is not widely adopted in Calgary. Realizing the potential of cyclelogistics would require enabling policies, infrastructure and business models. While this report focuses on cargo e-bike adoption, supportive measures would also benefit pedal-powered cargo bikes and other micromobility modes, creating broader system-wide benefits.

1.1 Methodology

This report combines quantitative and qualitative methods to examine the potential for cyclelogistics in Calgary. Specifically, this report includes:

- An assessment of the maximum potential for bike-based delivery in Calgary, according to density, population, land use, built form and transportation networks.

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[3] Health Canada, *Health impacts of traffic-related air pollution in Canada*, Table 15 (2022), 36. https://www.canada.ca/en/health-canada/services/publications/healthy-living/health-impacts-traffic-related-air-pollution.html

[4] Statistics Canada, "Labour force characteristics by industry, annual (x 1,000)," Labour Force Survey, Table 14-10-0023-01, 2025. https://doi.org/10.25318/1410002301-eng

[5] Conference Board of Canada, Calgary CMA GDP Information, Feb 2024. Cited in Calgary Economic Development, *Request for Proposal: Transportation & Logistics Sector Study – Calgary Region*, Reference Number: 2409-001 (2024), 7. https://calgaryeconomicdevelopment.com/assets/Transportation-Logistics-Benchmarking-Sector-Study-RFP-Final.pdf

[6] City of Calgary, *The Calgary Goods Movement Strategy* (2018), 10. https://www.calgary.ca/planning/transportation/goods-movement-strategy.html

[7] Calgary Economic Development, "Calgary: A Top Transportation and Logistics Hub," February 24, 2021. https://www.calgaryeconomicdevelopment.com/newsroom/calgary-a-top-transportation-and-logistics-hub/

- A review of best practices, bike plans and policies across other cities to identify effective strategies to support cyclelogistics.
- An analysis of the barriers to implementation, including challenges within businesses and those that can be addressed by various levels of governments or regional authorities, based on a series of interviews with businesses, government agencies and business improvement areas.

A clear and actionable set of recommendations is provided to help overcome these barriers and put Calgary on a path to realizing the full potential of cyclelogistics.

1.2 Policy background and context

The City of Calgary's Climate Strategy sets out a goal to reduce GHG emissions by 60% below 2005 levels by 2030, and to reach net-zero emissions by 2050.[8] To achieve these targets, the City has adopted several transportation-related objectives:

- By 2030, 40% of all trips should be made by walking, wheeling or transit.
- By 2050, a 25% reduction in daily vehicle kilometers travelled per capita.
- By 2050, all vehicles registered in Calgary should be zero-emission vehicles.

To support these objectives, the City has developed a range of strategies aimed at shaping the future of movement of people and goods. Table 1 summarizes key plans and identifies specific measures that support the shift to zero- and low-carbon freight transportation.

Table 1. City of Calgary cyclelogistics plans

Plan	Description	Actions to move goods by low- and zero-emission modes
The Calgary Goods Movement Strategy (2018)[9]	Outlines a vision to support a multi-modal system that is safe, economical and sustainable.	Partner with couriers to pilot cargo e-bicycles for last-kilometre delivery in selected urban areas. Work with private industry to implement potential GHG reduction measures for goods movement. Support the creation of an urban freight research centre in Calgary.

[8] City of Calgary, *Calgary Climate Strategy – Pathways to 2050* (2022), 4. https://www.calgary.ca/environment/policies/climate-strategy.html

[9] City of Calgary, *The Calgary Goods Movement Strategy* (2018). https://www.calgary.ca/planning/transportation/goods-movement-strategy.html

Municipal Development Plan (2020)[10]	Details goals and objectives to guide city building and growth.	Create a selection of multi-modal streets that emphasize different modes of transportation. Create a compact urban form and complete communities to encourage active transportation and reduce vehicular trips. Enable mobility policy that ensures convenient and high-quality parking locations for bikes and vehicles with environmental benefits.
Calgary Transportation Plan (2020)[11]	Provides policy direction for Calgary's transportation system.	Monitor developments in technologies that are expected to significantly change travel and land use patterns. In consultation with the Province of Alberta, investigate the feasibility of road-pricing. Develop a comprehensive curb-space management strategy.
Calgary's Electric and Low-Emissions Vehicle Strategy (2018)[12]	Aims to respond to the growing demand for electric vehicle infrastructure and to support adoption.	Partner with the private sector and other government agencies to implement local and regional electric vehicle (EV) charging infrastructure. Work with the private sector and non-profit organizations to develop an EV education program for the general public and businesses. Streamline municipal and utility processes to support public and private EV projects and reduce barriers.
Calgary Climate Strategy – Pathways to 2050 (2022)[13]	Provides strategic direction to climate-related activities, programs and initiatives.	Develop process and financial incentives to support low-carbon and zero-emissions fleet vehicles. Establish Zero Emissions Transportation Zones. Work with the province to implement road pricing tools that address direct user-pay costs of travel. Increase investment in walking and wheeling infrastructure to support full implementation of the 5A network by 2050.

[10] City of Calgary, *Municipal Development Plan* (2020). https://www.calgary.ca/content/dam/www/pda/pd/documents/municipal-development-plan/2020-municipal-development-plan.pdf

[11] City of Calgary, *Calgary Transportation Plan* (2020). https://www.calgary.ca/content/dam/www/transportation/tp/documents/ctp2020/2020-calgary-transportation-plan.pdf

[12] City of Calgary, *Calgary's Electric and Low-Emissions Vehicles Strategy* (2018). https://www.calgary.ca/environment/policies/electric-mobility-strategy.html

[13] City of Calgary, *Calgary Climate Strategy – Pathways to 2050*. https://www.calgary.ca/environment/policies/climate-strategy.html

		Investigate additional pricing structures (e.g., road tolls, parking fees) to shift demand to low-carbon modes.
Climate Resilience Strategy (2018)[14]	Seeks to support a low carbon future while reducing the impacts of a changing climate.	Monitor and provide input to new medium- and heavy-duty low-emission vehicle policies and regulations developed by other orders of government. Develop a program to support the assessment of alternative fuel technologies for commercial vehicle fleets and provide educational resources and information on emerging regulations from other levels of government. Enhance the safety and accessibility of walking and cycling for all citizens. Support the utilization of new and innovative bicycle technologies and programs.
2023–2026 Climate Implementation Plan[15]	Describes the actions and programs between 2023 and 2026 that accelerate towards net-zero by 2050.	Leverage funding from other orders of government to provide support to implement EV charging infrastructure. Require all new residential buildings to be EV-ready and commercial buildings to be 10% EV-ready with 90% conduit/partial readiness. Explore ways to increase investment in walking and wheeling infrastructure, and revise community design and development standards.

While achieving these goals will likely require an "all-of-the-above" approach that supports a variety of low-emission technologies and vehicles, cargo e-bikes can play a role in encouraging mode shift and supporting the overall transition away from internal combustion vehicles.

1.3 Definitions

There are several terms commonly used to describe the infrastructure that supports goods movement by bike, as well as the different types of bicycles used for delivery:

- **Cargo bikes** are pedal-powered or electric-assist bicycles designed and manufactured specifically for transporting goods. They come in a variety of shapes and sizes and may have two, three or four wheels. They are sometimes referred to as freight bicycles, carrier

[14] City of Calgary, *Climate Resilience Strategy* (2018). https://www.calgary.ca/content/dam/www/uep/esm/documents/esm-documents/climate-resilience-plan.pdf

[15] City of Calgary, *2023-2026 Climate Implementation Plan* (2022). https://www.calgary.ca/environment/policies/climate-implementation-plan.html

cycles, freight tricycles, box bikes or cycle trucks.[16] This report focuses specifically on the adoption of cargo electric-assist bicycles (e-bikes).

- **Cyclelogistics** refers to the integration of bicycles into the goods movement network to improve delivery efficiency and reduce the impacts of freight transportation in cities.[17]
- **Last-mile delivery** describes the final stage of the logistics process, in which goods are transported from a hub (such as a microhub or consolidation centre) to their final destination — typically to the consumer.[18]
- **Logistics hubs** are facilities used for the bundling and processing of goods for dispatch and delivery. Smaller-scale facilities located near the final delivery point, and which tend to service urban areas, are sometimes referred to as microhubs,[19] but may also be called micro-consolidation centres, transfer points, city hubs, local delivery hubs, urban depots, or urban distribution centres. Such facilities provide space for goods to be transloaded from larger freight vehicles to cargo e-bikes or other compact delivery vehicles that then deliver goods to their final destination. The term consolidation centre is also commonly used, although it often describes larger facilities located just outside of a city's border.[20]

[16] City of Vancouver, *Cargo Bike Guide for Businesses* (2022), 4. https://vancouver.ca/files/cov/cargo-bike-toolkit-for-businesses.pdf

[17] City of Vancouver, "Moving goods and services by bike," 2025. https://vancouver.ca/streets-transportation/cycling-related-business-licences.aspx

[18] Onfleet, Inc. "Last Mile Delivery, What it is and How You Can Succeed at it," January 21, 2023. https://onfleet.com/blog/what-is-last-mile-delivery/

[19] Walther P. van Amstel, "Microhubs defined," *CityLogistics*, May 20, 2020. http://www.citylogistics.info/research/2895/

[20] Janelle Lee, Carolyn Kim and Lindsay Wiginton, *Delivering Last-Mile Solutions* (Pembina Institute, 2019), 13. https://www.pembina.org/reports/delivering-last-mile-solutions-june-2019.pdf

2. Jurisdictional scan

Many leading jurisdictions across the world have set up plans to support cyclelogistics. These policies have helped start a growing market for cargo e-bike delivery that can supplant freight vehicles. In this section, we identify a list of best practices implemented by cities around the world that support delivery by bike in municipal bike plans and goods movement strategies.

Invest in the expansion and enhancement of cycling infrastructure and urban design

Infrastructure that can support cyclelogistics — such as microhubs, protected bike lanes and bike parking — is essential to ensuring that riders feel safe and able to operate cargo e-bikes. Cities that want to promote cyclelogistics will plan for all elements of bike operations.

- *New York City:* To accommodate the rise of e-micromobility devices, New York City is piloting outdoor electric bike storage, charging solutions and hub programs that use existing infrastructure, like vacant newsstands, to provide a place to rest and recharge for delivery workers.[21] Infrastructure improvements are also being made through comprehensive street design, which include wider or multiple lanes, passing zones and bicycle speed signal timing progressions. Bicycle parking is also being supported through improved curbside policies to reduce double parking, bike parking for different uses and cargo e-bike loading zones.[22]
- *Toronto:* The City of Toronto's Freight and Goods Movement Strategy contains strategic actions to address the challenges, such as increased emissions and congestion, caused by the growth in freight. One of the actions is to promote the use of cargo bicycles by identifying infrastructure needs, including security, storage and electrical charging stations and safety considerations for cargo e-bikes.[23]
- *Dublin:* The City of Dublin's City Development Plan encourages the repurposing of multi-storey car parks as central mobility hubs providing high density bike parking, electric charging facilities, shared mobility services and "last mile" delivery hubs.[24]

[21] City of New York, *Charge Safe, Ride Safe: NYC's Electric Micromobility Action Plan* (2024), 15. https://www.nyc.gov/assets/home/downloads/pdf/office-of-the-mayor/2023/micromobility-action-plan.pdf

[22] New York, *Charge Safe, Ride Safe*, 32.

[23] City of Toronto, *Freight and Goods Movement Strategy* (2020), 15. https://www.toronto.ca/legdocs/mmis/2020/ie/bgrd/backgroundfile-157033.pdf

[24] Dublin City Council, "Chapter 8: Sustainable Movement and Transport," *Dublin City Development Plan 2022-2028* (2022), 256. https://www.dublincity.ie/sites/default/files/2022-12/Final%201-08%20Sus%20Mov.pdf

- *London:* The City of London's Cargo Bike Action Plan estimates that in Central London, cargo e-bikes could replace up to 9% of van kilometres by 2025 and 17% of van kilometres by 2030 with the right set of policies. Infrastructure is key — while London already has extensive cycling infrastructure, it recognizes that cargo e-bikes are wider and longer than other bicycles. Therefore, infrastructure that caters to passenger bikes will not be sufficient. Comfortable turning paths for cargo e-bikes, lane widths, gradients and physical barriers need to be integrated into designs.[25]

Discourage the continued use of traditional delivery methods

Some cities are implementing low or zero-emission zones or mobility pricing, which improve air quality in the city centres and push businesses to explore alternatives.

- *Rotterdam:* In 2019, the City of Rotterdam developed and signed an agreement with the logistics sector to introduce a zero-emission city logistics zone by 2025. One plank of the energy transition is to encourage a shift to non-motorized transport modalities, such as cargo e-bikes, where possible.[26]
- *Montreal:* Montreal's Transport Electrification Strategy recognises that for the city to become carbon neutral by 2050, mobility must be focused on public transit, active transportation and electric vehicles. It has started work on the introduction of the first Low Emission Zone in Montreal and launched a public consultation to specify its terms.[27]

Adjust and harmonize regulations at all levels of government to minimize barriers and restrictions on cargo cycle usage

Regulatory complexity and uncertainty around issues such as curbside and parking policies, safety guidelines and speed restrictions deter businesses and riders from using cargo e-bikes. Ensuring a consistent and supportive set of regulations reduces barriers to entry.

- *Ottawa:* Ottawa's Transportation Master Plan seeks to enable the use of smaller, human-powered and electric vehicles for goods movement. One way to do so is enable bylaws, curbside management practices and zoning that permits small urban distribution centres and stand-alone pick-up facilities.[28]

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[25] Transport for London, *Cargo bike action plan* (2023), 5, 17. https://content.tfl.gov.uk/tfl-cargo-bike-action-plan-2023-acc.pdf

[26] City of Rotterdam, *Covenant ZECL Together towards zero (*2021), 5. https://logistiek010.nl/app/uploads/2022/03/Covenant-Zero-Emission-City-Logistics-Rotterdam.pdf

[27] City of Montreal, *Transportation Electrification Strategy 2021-2023* (2023), 35. https://portail-m4s.s3.montreal.ca/pdf/strategie_electrification_des_transports_2021-2023_ang_finale.pdf

[28] Engage Ottawa, "Transportation Master Plan: Movement of Goods," 1. https://engage.ottawa.ca/11511/widgets/45934/documents/71460

- *London:* Recognizing that regulations need to protect both bike riders and other road users, London is updating and revising cargo e-bike safety guidance for operators and riders that provide advice on safety and operating practices.

Procure low- and zero-emission vehicles within government-owned fleets

Municipal governments can lead the way by using low-impact vehicles where appropriate, which can generate market demand and reduce compliance costs.

- *Vancouver:* Continue to demonstrate corporate leadership in procurement and operating by using low-impact approaches for City-related services and deliveries.[29]
- *Westminster City:* Westminster City has set, as a stretch target, the goal of reducing the absolute numbers of freight, servicing and delivery vehicles in Westminster by 80% by 2040, with all such trips being zero-emission as well. One strategic action to reach this goal is to engage in smart buying, achieving behavioural change and support programs for residents through policies like embedding cargo e-bike schemes into the city council's wider supply chains and across its services.[30]
- *Montreal:* Replace all subcompact municipal vehicles that have reached the end of their use life with electric subcompact models.[31]

Investigate possibilities for integrating multimodal goods movement

Cargo e-bikes are most effective as part of the "last mile" delivery, where they take goods from logistics centres to residences and businesses. Therefore, integration with existing modes of freight transport is critical.

- *New York City:* The Commercial Bicycle Pilot Program allows enrolled companies to use bicycles to load and unload where commercial vehicles can do so, as well as at designated cargo e-bike corrals.[32] The City is also exploring multimodal freight operation at underutilized landings to support barge and/or freight ferry to use cargo e-bikes or other sustainable modes.

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[29] City of Vancouver, *Transportation 2040* (2012), 54. https://vancouver.ca/files/cov/Transportation_2040_Plan_as_adopted_by_Council.pdf

[30] City of Westminster, *Freight, Servicing and Deliveries: Strategy and Action Plan 2020-2040* (2021). https://www.westminster.gov.uk/sites/default/files/media/documents/Freight%2C%20Servicing%20and%20Deliveries%20Strategy%20and%20Action%20Plan%202020%E2%80%932040.pdf

[31] Montreal, *Transportation Electrification Strategy 2021-2023*, 31.

[32] New York City DOT, *Delivering Green* (2021), 6. https://www.nyc.gov/html/dot/downloads/pdf/freight-vision-plan-delivering-green.pdf

- *London:* Work with operators, boroughs, business improvement districts, and landowners to support multimodal trials that enable integrated logistics modes, including cargo e-bike, water and rail.[33]

Support education and awareness building

Since cargo e-bike operations are new, there will be a period of trial and error as businesses learn how to use them most effectively. Fear of change could also prevent businesses from adopting cargo e-bikes. Data collection and knowledge sharing (e.g., workshops, resources) will build confidence and help build the business case for exploring the use of cycle delivery.

- *Portland:* Portland's 2040 Freight Greenhouse Gas Reduction Best Practices identifies cargo e-bikes as part of an overall strategy to reduce freight emissions.[34] Cargo e-bike use can be increased by working with the private sector to disseminate information on cargo e-bikes and establish peer knowledge exchanges.
- *Sydney:* Provide information and support for workplaces wanting to set up a bike fleet or encouragement programs.[35]
- *Boston:* Boston's Zero-Emission Vehicle Roadmap identifies several ways to advance e-bikes, including supporting small businesses and delivery services to incorporate e-bikes in their fleet through education and outreach.[36]

Offer incentives and other demand-oriented policies

Cargo bikes represent an upfront cost for businesses, including a period of adjustment as they have to engage in route planning and utilize new infrastructure. Subsidy schemes, exemptions from road pricing or access to restricted zones can support them through this transition period. Additionally, many businesses rely on third-party operators for deliveries or cannot justify the cost of hiring bicycles just for their own businesses — lending libraries can address this issue.

- *City of Glasgow:* Support the development of cargo e-bike lending libraries across the city to include a range of models with different carrying capacities.[37]

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[33] London, *Cargo bike action plan*, 20.

[34] City of Portland, *2040Freight: Freight Greenhouse Gas Reduction Best Practices* (2022), 18. https://www.portland.gov/sites/default/files/2022/2040freight_freight_greenhouse_gas_reduction_best_practices.pdf

[35] City of Sydney, *Cycling Strategy and Action Plan 2018-2030* (2022), 10. https://www.cityofsydney.nsw.gov.au/strategies-action-plans/cycling-strategy-and-action-plan at p.10

[36] City of Boston, *Zero-Emission Vehicle Roadmap* (2020), 23. https://www.boston.gov/sites/default/files/file/2020/10/Boston%20ZEV%20Roadmap_1.pdf

[37] Glasgow City Council, *Glasgow's Active Travel Strategy 2022-2031* (2022), 46, Table 2.2.4. https://citizen.glascc1-prd.gosshosted.com/media/4029/Active-Travel-Strategy-2022-2031/pdf/GCC_Active_Travel_Strategy-final_web_version_ze7hsbwz0qyl.pdf

- *New York City:* Seek federal funding to create an incentive program for businesses to purchase cargo e-bikes,[38] and explore designating "green loading zones" reserved for particular vehicle types to incentivize electric vehicle and cargo e-bike adoption.[39]

Encourage exploration, testing and pilot projects

Pilot projects are small steps that municipalities can take that provide operators with information about how cargo bikes could work and address operational or financial concerns.

- *Westminster City:* Develop and implement a cargo e-bike pilot and trial, which provides scheme riders with free training and support from a partner.
- *New York City:* New York City launched its Commercial Cargo Bike Pilot Program in 2019 with three participants and 100 bikes, allowing bicycles enrolled in the pilot to load and unload wherever commercial vehicles can and at designated bike corrals.[40] Since then, cargo e-bike deliveries have increased significantly. In 2022, cargo e-bikes made more than 130,000 trips, delivering over five million packages.[41]
- *Seattle:* Develop a four-month microhub pilot that could be used for last-mile delivery by bike or on foot.[42]

[38] City of New York, "Mayor Adams Releases "PlaNYC: Getting Sustainability Done," New York City's Strategic Climate Plan," media release, April 20, 2023. https://www.nyc.gov/office-of-the-mayor/news/274-23/mayor-adams-releases-planyc-getting-sustainability-done-new-york-city-s-strategic-climate-plan#/0

[39] T. Maxner, P. Goulianou, A. Ranjibari, A. Goodchild, *NYC Zero-Emission Urban Freight and Green Loading Zone Market Research*, prepared by Urban Freight Lab for the City of New York DOT (2021), 4. https://urbanfreightlab.com/publications/nyc-zero-emissions-urban-freight-and-green-loading-zones-market-research/

[40] New York City DOT, *Commercial Cargo Bicycle Pilot: Evaluation Report* (2021), 4. https://www.nyc.gov/html/dot/downloads/pdf/commercial-cargo-bicycle-pilot-evaluation-report.pdf at p.4

[41] New York City DOT, "NYC DOT Authorizes the Use of E-Cargo Bikes on City Streets and Establishes Key Safety Standards," media release, March 27, 2024. https://www.nyc.gov/html/dot/html/pr2024/e-cargo-bike-on-city-streets.shtml

[42] Supply Chain Transportation and Logistics Center, The Seattle Neighborhood Delivery Pilot Project: An Evaluation of the Operational Impacts of a Neighborhood Delivery Hub Model on Last-Mile Delivery (University of Washington, 2021), 5. https://depts.washington.edu/sctlctr/sites/default/files/research_pub_files/UFLSea-Neighborhood-Delivery-Hub_Final-Report.pdf

3. Exploring the Calgary context

Following the global regulatory scan, we conducted a deeper assessment of the Calgary context to understand how these best practices could be applied. To this end, we conducted both a qualitative and quantitative analysis of the delivery landscape in Calgary and the potential for cargo e-bike delivery. First, we conducted interviews with key stakeholders in the logistics space, as described in this section. We also conducted an equity-based analysis of cargo e-bike adoption using the Calgary Equity Index.

We used insights from these interviews to develop our market assessment tool to determine the percentage of freight in Calgary that could be delivered by cargo e-bike given current conditions; this is described in the next section.

3.1 Stakeholder interviews

Methodology

Interviews were completed from November 2024 to April 2025. Four stakeholder categories were identified to initiate stakeholder mapping and interview outreach:

- Existing and potential cargo e-bike logistics and delivery companies
- Existing and potential cargo e-bike delivery clients (businesses)
- Government agencies
- Business improvement areas (BIAs)

To understand the challenges and opportunities in implementing bike delivery, we focused on engaging with people in ownership, operations management or in decision-making positions. On-the-ground delivery staff were not included in interviews for this project. Future research may seek to gather feedback from those who directly operate delivery vehicles.

Participants were contacted via email to participate in interviews. Interviews lasted approximately 45 minutes and were conducted by the Pembina Institute. Interview questions were developed in collaboration with the City of Calgary and the Pembina Institute to elicit feedback relating to challenges and opportunities in implementing bikes for goods movement. The following nine categories were explored:

- Financial (e.g., the cost of bikes and associated maintenance)
- Regulatory (e.g., permits, business licences, land use)
- Technological (e.g., bike specifications, quality)
- Infrastructure (e.g., access to cycle paths, parking, storage)

- Safety and security (e.g., theft, collisions with other road users)
- Informational (e.g., access to data, knowledge transfer)
- Operational (e.g., training, management)
- Attitudinal (e.g., reputation, perceptions)
- Geographical (e.g., weather, topography)

Participants were also asked if there were other barriers and opportunities beyond those listed above. Additionally, we asked participants to share potential strategies to encourage bike implementation, as well as for alternative delivery vehicle options (e.g., electric delivery vans, low-speed commercial vehicles, autonomous delivery robots, etc.) that they were actively considering or would consider in the future. The interview process and questions were adapted according to the specific profile of each interviewee. A full set of the questions used can be found in Appendix B.

To analyze feedback from interview participants, interview recordings were transcribed and synthesized into key thematic areas. In the following section, we describe interview findings in detail.

Interview findings

A total of 15 interviews were completed throughout the study period. Table 2 below breaks down the sample of interview participants into stakeholder groups.

Table 2. Number of interview participants by stakeholder groups

Stakeholder group	Number of participants
Logistics and delivery companies	4
Delivery clients	3
Government agencies	3
BIAs	5

By and large, the interviewees had largely not incorporated cargo e-bikes into their operations or services. While they expressed interest in the concept, there has been no real use of cargo e-bikes in the Calgary Region.

In interpreting the interview findings, it is important to recognize that the collected input reflects experiences and perspectives regarding bike use in its early stages of adoption. In addition, we had difficulty connecting to existing and potential cargo e-bike logistics clients, particularly large-scale retailers. In some cases, we were also unable to connect with certain

BIAs within the Calgary Region, with representatives noting that few to no businesses within their area were operating bikes, and thus they were unable to share insights with us.

Below, we identified some key themes that emerged from our interviews on the challenges and opportunities for goods movement. The responses relating to all the barriers, as well as a breakdown according to stakeholder group, are detailed in Appendix C.

3.2 Key themes

Financial

Financial barriers emerged as a significant concern among stakeholders. They indicated that high start-up costs could pose a challenge for businesses, noting that each bike costs approximately $8,000. For a business requiring ten bikes, this would represent an $80,000 upfront investment. With the removal of the federal Zero-Emission Vehicle Incentive Program (ZEVIP), stakeholders also expressed concerns about the total cost of ownership and the perceived opportunity cost. As government agencies have reported that the increase in cycling has been lower than anticipated, businesses risk not achieving a return on investment within the expected timeframe and they must factor this into their considerations around cargo e-bike deployment. They prefer to take incremental steps rather than making a major leap, especially as the business case continues to evolve.

Moreover, stakeholders identified costs associated with ongoing maintenance, adding delivery routes, and securing storage facilities as additional financial barriers. However, they also highlighted the financial opportunities of cargo e-bikes, such as savings on fuel and maintenance compared to traditional delivery vans.

Infrastructure

Stakeholders identified infrastructure as a key determining factor for cargo e-bike adoption. While the city is making efforts, stakeholders pointed out that bike pathways remain insufficient and Calgary's existing downtown cycling network features narrow lanes unsuitable for cargo e-bikes. They emphasized the need for infrastructure upgrades and expansion into the inner suburbs to enhance safety and encourage more businesses to integrate cargo e-bikes into their operations. Additionally, parking structures and storage facilities will require electrical line connections to support them.

Given that some warehouses are located far from downtown and travelling by bike can be time-consuming, stakeholders highlighted the importance of establishing microhubs to support cargo bike operations. These hubs could include charging stations, provide storage, and serve as

replenishment nodes. One company currently using cargo e-bikes operates out of a repurposed storage facility, which both provides bike storage and functions as a central meeting point for employees. Also, since many condominiums and apartments lack adequate bike parking, a stakeholder suggested introducing neighbourhood parking shelters, potentially made available on a subscription basis by the city's parking authority. Improved signage for bike parking was also identified as a supportive measure to encourage broader adoption.

Several infrastructure advantages were identified, including the ongoing electrification of the city's fleet, the city's expansion of charging stations, the widespread presence of ramps on existing sidewalks and the ability to park on sidewalks in most areas. Stakeholders consider cargo e-bikes a viable option for peak travel times, especially in high-density areas where multiple deliveries can be made in short windows of time.

Informational and operational

Most stakeholders interviewed were open to exploring the use of cargo e-bikes in their operations. However, there was limited awareness regarding their potential use, along with general uncertainty about how to integrate them into business operations. Many businesses remain unaware of the benefits of cycling, trip generation and how cargo e-bikes can benefit their bottom line. Further understanding is needed of bike capacity, restocking frequency, working hours and cost impact.

Geography and climate

Stakeholders frequently cited Calgary's geography and climate as barriers to cargo e-bike adoption. Operating cargo e-bikes during snowfall is challenging due to inadequate snow clearance and concerns about rider safety. While the city has implemented several bike lanes, particularly on major routes, snow often accumulates in these lanes during winter months. Additionally, battery performance tends to decrease in cold weather. Most stakeholders agreed that cargo e-bikes cannot be used year-round, and limiting their use to summer months would result in long periods of inactivity. This creates logistical challenges, as employees would have to transition between different modes of transport.

Moreover, stakeholders highlighted that Calgary's spread-out geography makes cargo e-bike travel challenging outside of downtown. While bikes can navigate downtown quickly, especially in high traffic, bike lanes outside the core are sparse and often lack connectivity. However, improvements have been noted.

In light of these challenges, stakeholders pointed out several opportunities, such as adding bike lanes, creating double-wide sidewalks and installing signage to indicate bike and pedestrian use. Furthermore, interviewees emphasized the importance of a pilot hub program to determine the

most effective ways to deploy cargo e-bikes across various locations and seasons. Some also mentioned that Calgary's milder summers might encourage increased bike use.

Attitudinal

Attitudinal barriers emerged as a less significant constraint for many respondents, as they were cautiously open to cargo e-bikes and generally expressed the belief that their customers would welcome lower-emission transport options. While cycling in Alberta has been politicized to some extent, the general belief was that this would not impact the businesses of respondents. Additionally, several businesses stated that delivery workers may prefer delivery vans in severe weather conditions due to concerns around clear routes and employee safety.

3.3 Equity-based analysis

While direct engagement with equity-deserving businesses was not obtained during the stakeholder consultations, the Calgary Equity Index was used to conduct an equity-based analysis of cargo e-bike adoption in the city. The Calgary Equity Index is a mapping tool that highlights equity patterns across the city by combining data from 61 indicators into an overall equity score. It takes into account factors such as economic opportunity, human and social wellbeing, population health, community belonging and safety, accessibility and amenities, and climate and environment. Neighbourhood equity scores were overlaid with bike scores, which indicate how suitable an area is for biking. Key industrial zones were also identified.

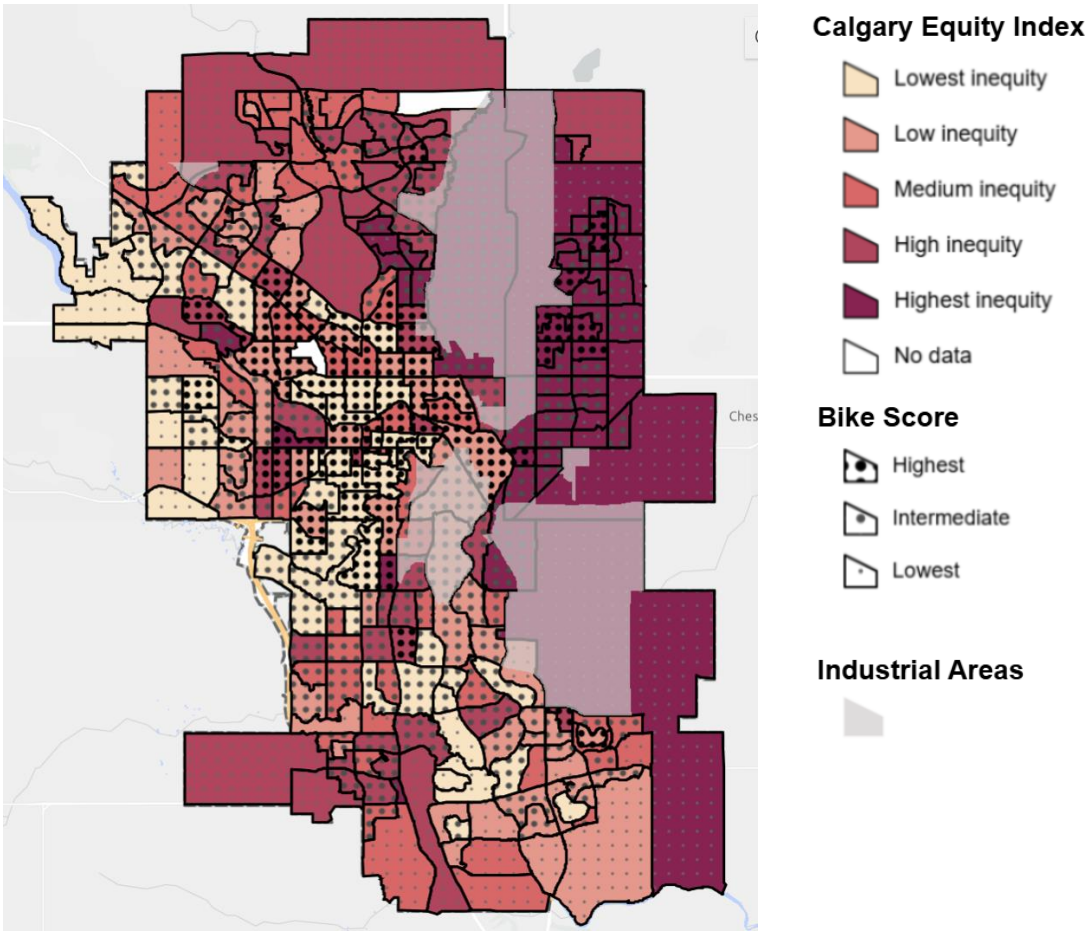

Figure 2. Calgary equity index map

Source: City of Calgary[43]

According to the index data presented in Figure 2, several areas with high inequity, particularly in the central parts of the city, have high bike scores as well. This includes an industrial zone in the northeast. Such neighbourhoods often lack adequate public transit options, and personal vehicle ownership is less common among lower-income households.[44] During the City of Toronto's Cargo E-Bike Pilot, stakeholders in equity-deserving neighbourhoods noted that cargo e-bikes would likely be in demand for personal use, such as grocery shopping and other daily errands involving heavy items. Cargo e-bikes could thus fulfil a function beyond business-to-business or business-to-customer delivery.

By developing cargo e-bike infrastructure such as bike lanes, parking and charging stations that serve businesses and are also open to the public for a fair and affordable fee, the City of Calgary can support greater uptake in equity-deserving neighbourhoods with high bike scores. Revenue

[43] The City of Calgary, Calgary Equity Index (2024). https://maps.calgary.ca/CalgaryEquityIndex/

[44] City of Toronto, *Cargo E-Bike Pilot* (2021), 8. https://www.toronto.ca/legdocs/mmis/2021/ie/bgrd/backgroundfile-173616.pdf

generated through these services can be reinvested to expand cargo e-bike access and infrastructure in other equity-deserving neighbourhoods — particularly those near the city's edges with lower bike scores. In doing so, Calgary can help build a more equitable and sustainable transportation system.

4. Market assessment

4.1 Methodology

We estimate the share of urban freight trips that cargo bikes[45] can potentially replace in the City of Calgary using a sequence of steps (Table 3), building on the approach used by the CycleLogistics project in the European Union (EU).[46] Combining the results from the four steps outlined below will provide a realistic estimate of the market potential for cargo bikes in the City of Calgary.

Step 1: Determining the trips suitable for cargo bike use includes three sub-steps. In Step 1a, we estimate the share of light commercial van and truck trips (trips by vehicles weighing less than 3,500 kg and with a payload carrying capacity of about 1,200 kg) as a percentage of total urban freight travel. In Step 1b, we estimate the share of light commercial van and truck trips with a low load factor (where the freight van or truck carries less than 20% to 30% of its full payload). Finally, in Step 1c, we estimate the share of light commercial van and truck trips with an average one-way travel distance of around 10 km — the distance that a cargo bike may feasibly cover.

Step 2: We compare the total cost of ownership and total cost per kilometre for cargo bikes relative to conventional light commercial vans and trucks. This is determined using data on the operational characteristics of cargo bikes, conventional vans and trucks. By comparing costs, we estimate the share of trips where cargo bikes offer a cost advantage.

Step 3: We consider the degree to which availability of cargo bikes impacts the uptake of cargo bikes for goods delivery in the City of Calgary. To do this, we draw from literature assessing supply side barriers and estimated market growth of cargo bikes across North America.

Step 4: The extent to which non-financial factors may affect the demand for cargo bikes is assessed. Due to limited research on the degree to which non-financial factors influence the uptake of cargo bikes among businesses and logistics providers, we draw on existing studies that demonstrate the impact of these factors on the uptake of other new vehicle technologies. We consider two hypothetical cases (pessimistic and optimistic) to generate an indicative estimate of the extent to which non-financial barriers can potentially impede the uptake of cargo bikes. We note that the degree to which behavioural factors play a role needs to be further investigated.

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[45] Data availability on cargo ebikes is limited. For this market assessment, we focus on pedal-powered cargo bikes. Speed and weight carrying capacities for cargo bikes are lower than e bikes. In that sense, the analysis presented here is intentionally conservative. E-bikes, which can travel faster and cover longer distances, will likely increase the share of freight trips that can be replaced by cargo bikes more broadly.

[46] Susanne Wrington and Karl Reiter, "CycleLogistics–Moving Europe Forward!," *Transportation research procedia* 12 (2016). https://www.sciencedirect.com/science/article/pii/S2352146516000478

Table 3. Assessment steps for calculation of cargo bike market potential

Assessment step	Description
Step 1a	Share of total urban freight trips made by light commercial vehicles
Step 1b	Share of light commercial vehicles with a low load factor
Step 1c	Share of light commercial vehicle trips with short trip length (up to 10 to 15 km)
Step 2	Share of trips where trip costs for cargo bikes are lower than for vans and trucks
Step 3	Share of trips for which cargo bike models are available
Step 4	Share of light commercial van trips replaceable by bikes when accounting for behavioural constraints

Using estimates derived from the four steps outlined above, the potential share of all freight trips substitutable by cargo bikes is calculated using the equation:

Step 1a *x* Step 1b *x* Step 1c *x* Step 2 *x* Step 3 *x* Step 4 x = Potential share of urban freight trips substitutable by cargo e-bikes

4.2 Analysis

Combining the results from Steps 1 through 4 (outlined in Table 4 below), we estimate that between 1% and 4% of all motorized urban freight trips in Calgary could be shifted from light commercial vans and trucks to cargo bikes. In the following sections, we present results for each step of the analysis.

Table 4. Estimated results from assessment steps

Assessment step	Results of analysis
Step 1a. Light commercial vehicle share of total urban freight trips	60–70%
Step 1b. Share of light commercial vehicles with a low load factor	10–30%
Step 1c. Share of light commercial vehicle trips with short trip length	50%
Step 2. Share of trips where trip costs for cargo bikes are lower than trucks and vans	25–50%
Step 3. Share of trips for which cargo bike models are available	100%
Step 4. Share of light commercial van trips replaceable by bikes when accounting for behavioural constraints	50–70%
Potential share of urban freight trips substitutable by cargo bikes	1–4%

4.2.1 Detailed analysis

Step 1a. Light commercial vehicle share of total urban freight trips

Due to their lower carrying capacity and typically shorter urban daily routes, light commercial vehicles (weighing around 3,500 kg) such as cargo vans and light trucks are ideal candidates to be substituted by cargo bikes. The potential modal shift to cargo bikes is therefore capped by the share of light commercial vehicle trips of the total urban freight trips.

On a typical weekday, the number of commercial trips in Calgary is about 190,000, more than 60% of which are made by light trucks.[47] To corroborate this, we look for estimates from other comparable cities and regions. TransLink's 2000 report on truck freight activity in Vancouver, which is the most recent data we could find, indicates that of the approximately 187,000 truck trips made in Vancouver on a typical day in 1999, 68% were made using light trucks and 32% using heavy trucks (weighing more than 12,000 kg).[48] In a study conducted for the Greater Toronto and Hamilton Area, light-duty commercial vehicles constituted 840,000 (or 61%) of the total 1,300,000 daily commercial vehicle trips.[49] This is similar to the split between light commercial and heavy-duty vehicle trips across Europe, as noted in the 2016 EU CycleLogistics project, which found that trips by light commercial trucks constituted 66% of urban freight trips, while the remaining (33%) trips were made by heavy-duty commercial vehicles — though the share of light commercial trucks was as high as 80% in some cities [50]

For this study, we assume the share of urban freight travel made using light commercial vehicle trips, and thus trips that can potentially be replaced by cargo bikes, ranges between 60% and 70%.

Step 1b. Share of light commercial vehicles with low load factor

Freight trucks typically operate at low load factors.[51] Across reviewed literature, the average load carried by a typical freight van or truck varies between 45% to 85% of the full load capacity of the vehicle. The American Transportation Research Institute estimates 15% to 20% of all

[47] J.D. Hunt, K. J. Stefan, and A. T. Brownlee, "Establishment-based survey of urban commercial vehicle movements in Alberta, Canada: survey design, implementation, and results," *Transportation Research Record* 1957, 1 (2006). https://doi.org/10.1177/0361198106195700111

[48] Translink. *1999 Lower Mainland Truck Freight Study* (2000), 8. https://www.translink.ca/-/media/translink/documents/about-translink/customer-service/trip-diary/goods-movement-study--truck-freight-study-summary-1999.pdf

[49] McMaster Institute for Transportation & Logistics, *Estimating Urban Commercial Vehicle Movements in the Greater Toronto*, prepared for Metrolinx (2010), 39. https://mitl.mcmaster.ca/app/uploads/2021/05/MITL_Metrolinx_Report.pdf

[50] Wrington, "CycleLogistics–Moving Europe Forward!"

[51] The load factor is the ratio of the average load weight carried by the vehicle to its total freight capacity.

truck trips in the U.S. are empty, while this number is as high as 43% in some truck categories.[52] In 2012, the Center for Excellence in Logistics and Distribution found that non-empty truck trips in the U.S. have an average load factor of 57% — in other words, trucks are carrying just 57% of their total capacity.[53] Past data from the U.K. indicates that load factors have historically remained at around 60%, while in Denmark, load factors for loaded (non-empty) trips fell from over 70% in 1984 to 47% in 1996.[54] Freight truck and van trips with low load factors are potential candidates for switching to cargo bikes, since cargo bikes have a lower carrying capacity compared to trucks and vans.

Cargo bikes can typically carry up to 200 kg,[55] though more advanced electric assisted multi-wheel cycles can carry up to 500 kg.[56] In comparison, a typical urban cargo van or light truck has a load capacity of 800 to 2000 kg.[57] This suggests that light commercial freight vehicle trips with

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[52] Alex Leslie and Dan Murray, *Analysis of the Operational Costs of Trucking: 2025 Update* (American Transportation Research Institute, 2025), 44. https://truckingresearch.org/wp-content/uploads/2025/07/ATRI-Operational-Costs-of-Trucking-07-2025.pdf

[53] R. Meller, K. Ellis, and B. Loftis, *From Horizontal Collaboration to the Physical Internet: Quantifying the Effects on Sustainability and Profits When Shifting to Interconnected Logistics Systems* (Center for Excellence in Logistics and Distribution, 2012), 1. Available at the Internet Archive, https://web.archive.org/web/20160304045406/http://faculty.ineg.uark.edu/rmeller/web/CELDi-PI/Final%20Report%20for%20Phase%20I.pdf

[54] Nadine Andra, Jean-Luc Michaux and Michel Andre, *Analysis of the load factor and the empty running rate for road transport* (2004), 28, 23. https://hal.science/file/index/docid/546125/filename/LTE0419-1.pdf

[55] Hanna Vasiutina, Andrzej Szarata and Stanisław Rybicki, "Evaluating the environmental impact of using cargo bikes in cities: A comprehensive review of existing approaches," *Energies* 14, no. 20 (2021). https://www.mdpi.com/1996-1073/14/20/6462

Carine Choubassi, Dan P.K. Seedah, Nan Jiang and C. Michael Walton, "Economic analysis of cargo cycles for urban mail delivery," *Transportation Research Record* 2547, no. 1 (2016). https://journals.sagepub.com/doi/abs/10.3141/2547-14

[56] Sophia Beckerand and Clemens Rudolf, "Exploring the potential of free cargo-bike sharing for sustainable mobility," *GAIA-Ecological Perspectives for Science and Society* 27, no. 1 (2018). https://www.ingentaconnect.com/content/oekom/gaia/2018/00000027/00000001/art00012

Mariusz Nürnberg, "Analysis of using cargo bikes in urban logistics on the example of Stargard," *Transportation Research Procedia* 39 (2019). https://www.sciencedirect.com/science/article/pii/S2352146519301267

Roberto Nocerino, Alberto Colorni, Federico Lia and Alessandro Lue, "E-bikes and E-scooters for smart logistics: environmental and economic sustainability in pro-E-bike Italian pilots," *Transportation Research Procedia* 14 (2016). https://www.sciencedirect.com/science/article/pii/S2352146516302733

[57] Sterling Fleet Outfitters, "The Best Cargo Van in Canada", October 27, 2024, https://sterlingfleetoutfitters.com/best-cargo-van-canada/

Vans Direct, "Which Small Vans Have The Largest Payload 2025?", May 2025, https://www.vansdirect.co.uk/blognews/which-small-vans-have-the-largest-payload/

Element Energy, *Cycle Logistics Study: Final report*, prepared for Cross River Partnership (2019). https://crossriverpartnership.org/wp-content/uploads/2019/03/20190520_Element-Energy_Cycling-logistics-study_FINAL-REPORT-1.pdf

a load factor of 33% or less can potentially be substituted by cargo bikes. Relatedly, previous studies estimate that cargo bikes can carry up to 10 to 25 parcels (which is typically 5% to 20% of the capacity of light trucks or vans).[58]

For this study, we assume that cargo bikes can replace trips by light commercial freight trucks where the load is up to a maximum of 20% to 30% of the vehicle's full capacity.

The Origin/Destination Survey conducted as part of the City of Calgary's Goods Movement Strategy shows that 43% of all trucks surveyed had a full load, 24% had a partial load and 30% were completely empty.[59] Furthermore, trucks travelling long distances were more likely to be full (60%) than trucks making local or regional trips (32%). Other regions show similar results. The City of Edmonton's 2013 Roadside Truck Survey found that 38% of trips were made with only partial load.[60] Results from the 1999 National Roadside Study suggests that about half of all trips made by freight trucks in Canada were less than half full. Of these, 30% of the trips were with zero load (empty trucks) and 10% of the trips were at 25% load. Moreover, for trip lengths lower than 50 km, only 30% of the truck trips were at full capacity.[61]

Thus, assuming load is the only constraint, we conclude that nearly 10% to 30% of all light commercial freight vehicle trips qualify to be substituted by cargo bikes. This assumption is similar to other studies, such as the EU CycleLogistics project, which assumes that about 25% of light cargo trips can be replaced by bikes.

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[58] Choubassi, "Economic analysis of cargo cycles for urban mail delivery."

Lei Zhang, Tilman Matteis, Carina Thaller and Gernot Liedtke, "Simulation-based assessment of cargo bicycle and pick-up point in urban parcel delivery," *Procedia Computer Science* 130 (2018). https://www.sciencedirect.com/science/article/pii/S1877050918303570

Florian Arnold, Ivan Cardenas, Kenneth Sörensen and Wouter Dewulf, "Simulation of B2C e-commerce distribution in Antwerp using cargo bikes and delivery points," *European Transport Research Review* 10, no. 1 (2018). https://etrr.springeropen.com/articles/10.1007/s12544-017-0272-6

Carlos Llorca and Rolf Moeckel, "Assessment of the potential of cargo bikes and electrification for last-mile parcel delivery by means of simulation of urban freight flows," *European Transport Research Review* 13, no. 1 (2021), 33. https://link.springer.com/article/10.1186/s12544-021-00491-5

[59] City of Calgary, *The Calgary Goods Movement Strategy: External truck origin/destination survey summary report,* prepared by Watt Consulting Group in association with David Kriger Consultants Inc. and CPCS Transcom Ltd (2018), 50. https://www.calgary.ca/planning/transportation/goods-movement-strategy.html

[60] City of Edmonton, *Roadside Truck Survey: Final Report* (2013), 23. https://www.edmonton.ca/public-files/assets/document?path=PDF/Roadside_Truck_Survey_Summary_Report_Feb_2013.pdf

[61] Richard Gilbert, *Reducing Greenhouse Gas Emissions from Truck Activity in Urban Areas* (2005), 11, 12. http://www.richardgilbert.ca/Files/2004/Reducing%20Greenhouse%20Gas%20Emissions%20from%20Truck%20Activity.pdf

Step 1c. Share of light commercial vehicle trips with short trip length

In order for cargo bikes to substitute for light commercial trucks and vans, the distance of a goods delivery trip must be within the distance typically travelled by a cargo bike. Several pilot and modelling studies conducted to estimate the market potential for cargo bikes across different cities assume a trip distance threshold of 7 to 10 km.[62] For example, across various European cities, average trip distances for cargo bikes were found to be 7 km. In Calgary, on average, bike commuters travel 10 km but some travel as much as 30 km.[63] For comparison, in Vancouver, while bikes have an average trip length of 4.9 km, more than 80% of bike trips were reported to be roughly 10 km.[64] Thus, for this study we assume cargo bikes can substitute light commercial vehicle trips of up to 10 to 15 km.

Now we examine the length of an average light commercial vehicle trip in Calgary. In the absence of empirical data on trip length, we estimate the length of the average commute by multiplying average vehicle speeds and average vehicle commuting times. In a 2021 study, the average 85th percentile vehicle speed was 35 km/h in Calgary.[65] Average commute time in Calgary is 24 minutes.[66] Thus, the product of average commute time and average speed gives an average trip length of 14 km.

Our estimate of average trip length for light trucks is similar to empirical results from other regions. For example, the average trip length for light and heavy commercial trucks in Vancouver was found to be 8.5 km and 15.8 km, respectively.[67] Average commercial trip distances in many European cities do not exceed 7 km.[68] A similar figure was obtained in a U.S.-

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[62] Llorca, "Assessment of the potential of cargo bikes and electrification for last-mile parcel delivery by means of simulation of urban freight flows," 33.

Kale AI, *Data-driven Evaluation of Cargo Bike Delivery Performance in Brussels*, prepared for Larry vs Harry APS (2023). https://www.larryvsharry.com/media/wysiwyg/cms_pages/Stories/Last_Mile_Delivery/Data-driven_Evaluation_of_Cargo_Bike_Delivery_Performance_in_Brussels.pdf

[63] Bike Calgary, "FAQs." https://bikecalgary.org/faqs/

City of Calgary, *Calgary Downtown Commuter: Cyclist Survey Report* (2006), 2. https://www.calgary.ca/content/dam/www/transportation/tp/documents/transportation_solutions/downtown-cyclist-survey-2007.pdf

[64] Llorca, "Assessment of the potential of cargo bikes and electrification for last-mile parcel delivery by means of simulation of urban freight flows," 33, 42.

[65] Rebecca Ling, et al., "The relationship between motor vehicle speed and active school transportation at elementary schools in Calgary and Toronto, Canada." *Journal of Transport & Health* 21 (2021). https://carsp.ca/en/presentations-and-papers/carsp-acpser-pri-virtual-conference-virtuelle-2021/relationship-between-motor-vehicle-speed-and-active-school-transportation-at-elementary-schools-in-toronto-and-calgary-canada-2/

[66] Statistics Canada, "Commuting time, 2011 to 2022", June 13, 2023. https://www150.statcan.gc.ca/n1/pub/14-28-0001/2023001/article/00003-eng.htm

[67] Translink. *1999 Lower Mainland Truck Freight Study*, 10.

[68] Vasiutina, "Evaluating the environmental impact of using cargo bikes in cities."

-based study, where the authors observed that the distance of most commercial delivery routes is less than 10 km.[69] Another 1986 U.S. survey found that light trucks travelled, on average, 9.6 miles (or about 16 km) per trip.[70]

Our assumption to assign Calgary-specific average speeds to light trucks is backed by the fact that most light trucks start and end their journey within the city. In Calgary, about 90% of trips by light pickup trucks were local or regional trips.[71] This trend is common across other Canadian cities. Over 93% of commercial movements in the Edmonton region both start and end within the region.[72] Similarly, according to a 2012 Applied Freight Research Initiative regional truck survey, 95% of light commercial truck trips take place within Metro Vancouver.[73]

Given that the average trip length is 14 km, we may conservatively assume about 50% of the light commercial van and truck trips are 14 km or less. Although the distribution of trip lengths is not known, there are likely to be many shorter trips versus fewer longer ones. Hence, if we assume that trip length is the only constraint, we estimate 50% of all light commercial van and truck trips in Calgary could be replaced by cargo bikes.

Step 2. Share of trips where trip costs for cargo bikes are lower than for vans and trucks

The transition to cargo bikes is heavily influenced by whether trip costs are lower for cargo bikes compared to vans and trucks. Cargo bikes tend to be a cost-competitive option in congested conditions, for deliveries close to a distribution center, and in areas with high residential density and low-volume deliveries.[74] Delivery trucks and vans are more cost effective for greater

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[69] Johannes Gruber and Santhanakrishnan Narayanan, "Travel time differences between cargo cycles and cars in commercial transport operations," *Transportation Research Record* 2673 (2019). https://www.researchgate.net/publication/332818991_Travel_Time_Differences_between_Cargo_Cycles_and_Cars_in_Commercial_Transport_Operations

[70] Samuel W. Lau, *Travel Truck Surveys: A review of the literature and state of the art* (Metropolitan Transportation Commission, 1995). https://rosap.ntl.bts.gov/view/dot/13308/dot_13308_DS1.pdf

[71] *The Calgary Goods Movement Strategy*, 24.

[72] J.D. Hunt et al., "A commercial movement modelling strategy for Alberta's major cities," presented at the 2004 Annual Conference of the Transportation Association of Canada, 9. http://conf.tac-atc.ca/english/resourcecentre/readingroom/conference/conf2004/docs/s15/hunt.pdf

[73] TransLink, *Moving the Economy* (2017), 14. https://www.translink.ca/-/media/translink/documents/plans-and-projects/roads-bridges-and-goods-movement/rgms_context_backgrounder.pdf

[74] Manali Sheth, Polina Butrina, Anne Goodchild 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* 11 (2019), 11. https://doi.org/10.1186/s12544-019-0349-5

Riccardo Ceccato and Massimiliano Gastaldi, "Last mile distribution using cargo bikes: a simulation study in Padova," *Giordano Editore* 90, no. 3 (2023), 2. https://doi.org/10.48295/ET.2023.90.3

distances and for large volume deliveries.[75] Relatedly, one business interviewed as part of this study reported that over a comparable time period (about six hours), a cargo bike travelled one-fourth the average distance travelled by a conventional van, suggesting that a van is more efficient at higher speeds and when travelling greater distances.

We compare the total cost of ownership (TCO) and total cost per kilometre (TCK) between a cargo bike and a conventional truck or van following approaches used by peer-reviewed academic sources.[76] The data that we used for the operational characteristics of cargo bikes and conventional vans and trucks is summarized in Table 5. Note that the cost calculation here does not consider costs associated with setting up microhubs for cargo ebikes in Calgary, which could increase the overall cost of operation of cargo bikes.

Table 5. Total cost of ownership inputs

Input	Cargo bike	Conventional van
Purchase price	$5000–$15,000[a]	$90,000
Fuel and maintenance cost (per year)	$3,600	$3,000
Insurance cost	$0	$722
Average delivery distance	27 km	110 km
Average delivery time	6.75 hours	6.07 hours

[a] Cost for an industrial sized, large capacity cargo cycle. Cargo bikes for personal use may be cheaper.

Data source: Provided by a large retailer in Canada that operates both a cargo bike fleet and delivery vans

Annual TCO consists of operating expenditure (variable costs such as fuel and maintenance) and capital expenditure (fixed costs such as purchase costs annualized over the vehicle lifetime). The sum of these two costs is then divided by the total distance travelled by the vehicle annually to get the TCK expressed in $/km.

Anne Büttgen, Belma Turan and Vera Hemmelmayr, "Evaluating Distribution Costs and CO2-Emissions of a Two-Stage Distribution System with Cargo Bikes: A Case Study in the City of Innsbruck," *Sustainability* 13 (2021). https://doi.org/10.3390/su132413974

Kale AI, "Data-driven Evaluation of Cargo Bike Delivery Performance in Brussels."

[75] Sheth, "Measuring delivery route cost trade-offs between electric-assist cargo bicycles and delivery trucks in dense urban areas."

[76] Patrick Plötz, Till Gnann and Martin Wietschel, "Modelling market diffusion of electric vehicles with real world driving data—Part I: Model structure and validation," *Ecological Economics* 107 (2014). https://doi.org/10.1016/j.ecolecon.2014.09.021

Guido Perboliand and Mariangela Rosano, "Parcel delivery in urban areas: Opportunities and threats for the mix of traditional and green business models," *Transportation Research Part C: Emerging Technologies* 99 (2019). https://doi.org/10.1016/j.trc.2019.01.006

We find that the relative competitiveness (measured in TCK) between light commercial trucks and cargo bikes depends on the average speed of the vehicle (and in turn the average distance travelled). If a conventional light truck covers four times the distance of a cargo bike in the same number of hours (as reported by one interviewee), the TCK for a cargo bike is higher than for vans. If in contrast, average speeds between cargo bikes and trucks are assumed to be similar, then the cargo bike trip costs $0.36/km (or 55% lower than a conventional light truck with a TCK of $0.82/km). This finding corresponds with existing literature (Table 6).

Table 6. Literature results for cost comparisons

Study	Delivery van		Cargo bike		Bike cost compared to van
	Original currency	Canadian dollars	Original currency	Canadian dollars	
This study		$0.82/km		$0.36/km	55% lower
Europe[77]	2.7 euro/km	$3.95/km	1.5 euro/km	$2.2/km	43% lower
Brazil[78]	22 Brazilian real/delivery	$6.03/delivery	17 Brazilian real/delivery	$4.66/delivery	23% lower

Thus, as noted, van and truck trips can be replaced by cargo bikes (as per cost criterion) where travel speeds are similar. With this in mind, we estimate the share of goods movement trips that operate at speeds comparable to cargo bike travel, and hence the share of trips that cargo bikes can feasibly replace.

We assume that cargo bikes travel at average speeds of 15–20 km/h in Calgary and can replace all light commercial trucks and vans that operate at that speed. This assumption is consistent with multiple studies that report bike speeds of around 10–25 km/h.[79] The City of Calgary's Downtown Commuter Cyclist travel survey reports average cycling speeds of 23.6 km/h in 2000 and 23.4 km/h in 2006[80]□

[77] Perboliand, "Parcel delivery in urban areas: Opportunities and threats for the mix of traditional and green business models."

[78] Carla de Oliveira Leite Nascimento, Ingrid Belcavello Rigatto, and Leise Kelli de Oliveira, "Characterization and analysis of the economic viability of cycle logistics transport in Brazil," *Transportation Research Procedia* 46 (2020), 193. https://www.sciencedirect.com/science/article/pii/S2352146520303811

[79] Nürnberg, "Analysis of using cargo bikes in urban logistics on the example of Stargard."

Choubassi, "Economic analysis of cargo cycles for urban mail delivery."

Llorca, "Assessment of the potential of cargo bikes and electrification for last-mile parcel delivery by means of simulation of urban freight flows," 33.

[80] *Calgary Downtown Commuter: Cyclist Survey Report,* 8.

The next step is to estimate the share of all light commercial vans and trucks that operate at 20 km/h. High frequency data collected by the Ministry of Transport in Ontario indicates average truck speeds of 39 km/h on roads across the province.[81] One estimate suggests that the average vehicle driving speed in Metro Vancouver during morning rush hour is 32.5 km/h.[82] A 2021 study found average vehicle speeds of 35 km/h in Calgary.[83] Thus, the average vehicle speeds in Calgary are likely to be similar to the average speeds between 32 and 37 km/h (averages for the Vancouver region and Ontario are noted above). If we assume a uniform distribution of vehicle speeds across trips, we can assume that 25% to 50% of all vehicle trips within Calgary are likely to be at an average speed of 20 km/h or lower.

Step 3. Share of trips for which cargo bike models are available

Multiple manufacturers in Canada and globally specialize in producing and selling different styles of cargo bikes for personal and commercial goods delivery.[84] However, some interviewees in this study noted limited local availability of different cargo bike models. We assume that supply issues will not pose a serious challenge over the long term.

In addition, it is challenging to quantify the degree to which cargo bike uptake is constrained by limited local cargo bike supply, as expressed in interviews. Based on our market research, we anticipate that a greater supply of cargo bikes and a wider range of models will become available as the micromobility market expands.[85] As such, we assume 100% of cargo bike demand will be met through adequate supply. Future research should seek to understand the extent to which bike availability plays a role in current and future cargo bike uptake.

[81] Government of Ontario, "2019 travel speed and performance measure-truck." https://icorridor-mto-on-ca.hub.arcgis.com/datasets/71111ea2631c415492f5acd32fa6964d_0/about

[82] Wanyee Li, "Vancouver contemplates 30 km/h speed limit to save lives on residential streets," *Toronto Star*, April 28, 2019. https://www.thestar.com/vancouver/vancouver-contemplates-30-km-h-speed-limit-to-save-lives-on-residential-streets/article_c9d53ee2-76b6-5017-9d07-25b9c3398bed.html

[83] Ling, "The relationship between motor vehicle speed and active school transportation at elementary schools in Calgary and Toronto, Canada."

[84] Vancouver, *Cargo Bike Guide for Businesses*.

[85] Grand View Research, "Cargo Bicycles Market Size, Share & Trends Analysis Report." https://www.grandviewresearch.com/industry-analysis/cargo-bicycles-market-report

Global Market Insights, "Cargo Bike Market Size," February 2023. https://www.gminsights.com/industry-analysis/cargo-bike-market

Step 4. Share of light commercial van trips replaceable by bikes when accounting for behavioural constraints

Extensive literature on consumer preferences has shown that non-financial and behavioural factors can influence the uptake of new vehicle technologies.[86] Factors such as risk perception and health concerns may prevent drivers or fleet operators from replacing commercial trucks and vans with cargo bikes.[87] Moreover, small fleet operators that own one or two vehicles may value the flexibility of using a single vehicle for a variety of uses (e.g., long distance travel, all-weather use, business and personal trips), a level of versatility that cargo bikes do not typically offer.

Interviews conducted in this study revealed concerns about shifting to cargo bikes due to challenges in attracting staff willing to ride bikes, as well as perceptions around operational comfort, safety and weather conditions. However, as the interview sample in this study is not representative of the Calgary's broader population, we refrain from extrapolating interview results to inform this market assessment. Future research is needed to understand the degree to which behavioural factors influence the uptake of cargo bikes for goods delivery in Calgary.

That said, to understand the potential effects of behavioural factors on cargo bike uptake, we present two potential cases. In an optimistic case, we assume all interview respondents that express willingness to shift to cargo bikes will in fact shift to bikes, provided other factors (e.g., trip length, total cost per kilometre, average delivery speed) are favourable. In the pessimistic case, we assume only a fraction of the respondents who express willingness would ultimately make the switch.

To inform these cases, we draw from existing literature. A 2015 study using a nationwide survey of courier companies in Germany found that 90% of the respondents expressed willingness to shift to cargo bikes, with the remaining preferring not to switch.[88] However, a 2022 study showed that of the 48% of 400 logistics companies that expressed intentions of shifting to cargo

[86] Ann-Kathrin and Iljana Schubert, "Functional perceptions, barriers, and demographics concerning e-cargo bike sharing in Switzerland," *Transportation Research Part D: Transport And Environment* 71 (2019) https://doi.org/10.1016/j.trd.2018.12.013

Gabriele Schliwa et al., "Sustainable city logistics—Making cargo cycles viable for urban freight transport." *Research in Transportation Business & Management* 15 (2015). https://doi.org/10.1016/j.rtbm.2015.02.001

[87] Christian Rudolph and Johannes Gruber, "Cargo cycles in commercial transport: Potentials, constraints, and recommendations." *Research in Transportation Business & Management* 24 (2017) https://doi.org/10.1016/j.rtbm.2017.06.003

Santhanakrishnan Narayanan, Johannes Gruber, Gernot Liedtke and Constantinos Antoniou, "Purchase intention and actual purchase of cargo cycles: Influencing factors and policy insights." *Transportation Research Part A: Policy and Practice* 155 (2022). https://doi.org/10.1016/j.tra.2021.10.007

[88] Johannes Gruber and Alexander Kihm, "Reject or embrace? Messengers and electric cargo bikes," *Transportation Research Procedia* 12 (2016). https://doi.org/10.1016/j.trpro.2016.02.042

bikes, only 32% actually purchased one. Their decisions were influenced by factors such as attitudes towards bikes, perceived health impacts and the convenience of driving.[89] In other words, for every 48 couriers (out of 100) who were willing to shift to cargo bikes, 32 (or 70%) actually did, while the remaining did not make the switch due to behavioural factors. Thus, the pessimistic case uptake of cargo bikes is about 70% of the uptake under the optimistic case.

In our interviews of Calgary-based businesses, about 70% of respondents expressed interest in cargo bikes. In the optimistic case, we thus assume that 70% of businesses will likely shift to cargo bikes. In a pessimistic case, we assume that about 50% (70% of the respondents who expressed interest) of logistics operators and businesses will adopt cargo bikes when the economics of bikes are favourable.

4.3 Potential emissions reductions

In 2022, emissions from on-road transport in Calgary totalled 5.73 megatonnes (Mt) of CO_2e.[90] Assuming that freight emissions in Calgary follow Canada's national averages — accounting for 27% of total transportation emissions — this would translate to approximately 1.56 Mt of CO_2e freight emissions in Calgary.[91] Therefore, a rough calculation suggests that replacing 1% to 4% of freight traffic with cargo bikes would reduce between approximately 0.15 and 0.62 Mt of CO_2e per year.

It is important to note that this is a rough estimate and does not account for the potential impacts of replacing medium-duty van and short-range trips in the city centre, which could have outsized effects on air quality given their proximity to residential areas. Furthermore, cargo e-bike delivery could have a compounding effect, as improvements in infrastructure and the creation of more microhubs further support cargo e-bike adoption.

4.4 Limitations

Due to the lack of detailed telematics data on freight vehicle loads and routes in Calgary, this market assessment is based on average values and the typical operating patterns of freight vehicles in Calgary and other peer cities. While traffic patterns in Calgary may differ from those in other cities like Vancouver, current data limitations prevent the ability to conduct a detailed

[89] Narayanan, "Purchase intention and actual purchase of cargo cycles: Influencing factors and policy insights."

[90] City of Calgary, "Community-wide GHG Inventory by Sector," November 25, 2024. https://data.calgary.ca/Environment/Community-wide-GHG-Inventory-By-Sector/tp2j-ztyy

[91] Transport Canada, "Transportation in Canada 2023: Greenhouse gas Emissions," June 19, 2024. https://tc.canada.ca/en/corporate-services/transparency/corporate-management-reporting/transportation-canada-annual-reports/transportation-canada-2023/greenhouse-gas-emissions

comparison. Furthermore, since the available data on loads and travel distances is based on pre-pandemic figures, it may not reflect recent shifts driven by the growth in urban deliveries during the post-pandemic period.

This analysis also focuses on freight delivery in the Calgary region and does not include food delivery (e.g., DoorDash, Skip the Dishes) or small-scale parcel delivery.

5. Recommendations

These recommendations are based on findings from interviews conducted with stakeholders and the jurisdictional scan of strategies deployed to support cyclelogistics. They aim to support the City of Calgary with its sustainable transportation goals.

A summary of the recommendations is presented as an action plan in Table 7 below, and they are discussed in more detail in this section.

These recommendations could be supported through funding from the Green Municipal Fund, which provides grants and loans to finance a switch to less polluting transportation systems.[92] The Local Government Fiscal Framework also provides local governments in Alberta with capital infrastructure and operating grant support.[93]

Table 7. Cyclelogistics action plan

Description	Responsibility
Recommendation 1: Support business development of cyclelogistics hubs	
Support businesses in the development of logistics hubs used for the bundling and processing of goods for delivery by bike. Propose and advocate for BIAs or delivery businesses to undertake a pilot of a shared microhub. *Key implementation steps and considerations*: • Examine and revise restrictive bylaws that impede build-out of hub facilities • Initiate pilot with extensive outreach and consultation with businesses, business improvement areas and other key stakeholder groups. • Implement monitoring and evaluation measures, gather feedback, and iterate hub to scale across city.	Lead role: • Local BIAs • Logistics companies In partnership or consultation with: • Industry associations • Local delivery clients
Recommendation 2: Expand cycle infrastructure and reevaluate design guidelines	
Support the expansion of cycling infrastructure to enhance connectivity between areas of the City. Cycle lane design guidelines should be evaluated to support the use of wider cargo e-	Lead role: • City of Calgary • Business improvement areas

[92] Green Municipal Fund, "About the Green Municipal Fund." https://greenmunicipalfund.ca/

[93] Government of Alberta, "Local Government Fiscal Framework," 2025. https://www.alberta.ca/local-government-fiscal-framework

bikes, along with the increasing utilization across diverse micromobility modes. *Key implementation steps and considerations:* • Direct investments to support the City of Calgary's Pathway and Bike Network (5A) Program. • Engage with businesses and fleets to confirm desirability of routes set out in the 5A plan. • Reevaluate bike lane design guidelines, with specific focus on assessing minimum cycle lane widths. • Ongoing consultation with communities to enhance and extend infrastructure as needs evolve.	In partnership or consultation with: • Local neighbourhoods • Logistics companies
Recommendation 3: Create cargo e-bike sharing program in Business Improvement Areas	
Support BIAs to pilot cargo e-bike services that can be used by business in their areas. *Key implementation steps and considerations:* • Work with BIAs to identify opportunities for bike sharing and understand logistical support needed. • Launch pilot programs with interested BIAs to provide bike sharing services. • Evaluate program to identify ways to improve and scale up resources.	Lead role: • Business improvement areas • City of Calgary In partnership or consultation with: • Local delivery clients • Logistics companies
Recommendation 4: Start a cargo e-bike pilot program	
Partner with logistics companies to support a cargo e-bike pilot program. *Key implementation steps and considerations:* • Identify logistics companies that would be willing to engage in a pilot program for cargo e-bikes in Calgary. • Support companies with identifying routes, obtaining bikes and starting pilot program. • Implement monitoring and evaluation programs.	Lead role: • City of Calgary • Logistics companies In partnership or consultation with: • Local delivery clients
Recommendation 5: Facilitate cyclelogistics awareness and knowledge building campaigns	
Engage in education campaigns to fill awareness and understanding gaps of existing and new information resources. This initiative should include a partnership with an agency to provide cargo e-bike training for stakeholders seeking to adopt e-bikes. Logistics companies can also be	Lead role: • City of Calgary In partnership or consultation with: • Logistics companies

encouraged to share anonymized data on bike operations. Lead by example through City use of cargo e-bikes. *Key implementation steps and considerations:* • Undertake stakeholder mapping to develop tailored outreach practices. • Develop and disseminate cargo e-bike guides for businesses. • Provide portal and information hub for resources. • Showcase cargo e-bikes to the public through use in City operations.	
Recommendation 6: Amend bylaws and regulations to facilitate cargo e-bike operations	
Maintain flexible access to parking and loading zones, and monitor high-traffic areas to ensure unobstructed access as the market evolves. *Key implementation steps and considerations*: • Ensure ongoing engagement with fleets and businesses. • Amend bylaws and ensure consistent rules around parking, sidewalk access and loading. • Consider infrastructure design elements to enhance access in high priority areas. • Establish supportive enforcement practices and evaluation measures. • Consider future adaptations.	Lead role: • City of Calgary • Business improvement areas In partnership or consultation with: • Local delivery clients • Logistics companies

Recommendation 1: Support business development of cyclelogistics hub

Peer review of goods movement strategies demonstrates that cyclelogistics hubs are critical. Stakeholders in this study stated that a microhub would enhance their ability to deliver by cargo e-bike and enable goods movement by cargo e-bike to be competitive with delivery by vans or trucks. Access to a central location to load and reload a cargo e-bike allows businesses to deliver more over a shorter period.

It is thus recommended that the City of Calgary support businesses in the development of microhubs by revising bylaws to facilitate their creation. Understanding the appropriate bylaw amendments will require engaging in a consultation process and discussions with businesses, logistics providers and equity-deserving communities and businesses. Possible amendments could include expedited planning permission and permit approvals, or favourable tax rates or rents.

The City can also work with logistics companies and BIAs to launch a cyclelogistics study and pilot microhub. Development of the hub can be initiated through outreach with businesses to identify design elements, set out roles and responsibilities for its use and management, and understand locations that can best support user needs.[94] These hubs could either be managed by individual logistics companies, or by BIAs who operate it for the benefit of businesses in their areas. The latter options help businesses pool resources and justify a collective investment in cyclelogistics which may not be feasible individually.

Other monitoring and evaluation measures should also be introduced to ensure the success of a cyclelogistics pilot hub. Before-and-after comparison of metrics can measure the delivery efficiency and emissions impact of the pilot. Other performance metrics may include staff and customer satisfaction, number of deliveries by and kilometres traveled using cargo e-bikes, cost of delivery, number and location of accidents, and infrastructure issues. Gathering this information as part of the pilot will help determine and support the long-term benefits of cyclelogistics. Lessons learned should be broadly disseminated to support other municipalities and jurisdictions in undertaking similar initiatives.

The City could also support development of a guide outlining best practices to develop microhub facilities. For example, Copenhagenize Design Co. has developed a cyclelogistics hub planning guide that sets out design considerations such as management models (i.e., singular vs. cooperative) and different hub structures (i.e., semi-stationary vs. stationary).

Microhubs do have limitations. For example, vehicles are still needed to transport goods from larger distribution centres (which could be located near the airport) to the microhubs. This process incurs costs and still contributes to downtown congestion and pollution. Businesses might find it more convenient to simply use the same vehicles to distribute goods to their customers, rather than having the additional step of using bikes.

Potential microhub locations

Our preliminary stakeholder survey and location review has identified potential microhub locations in five downtown parking areas, based on the following criteria: existing cycling infrastructure,[95] priority levels for snow and ice clearing, potential delivery demand (assessed

[94] CycleLogistics – City Changer Cargo Bike, *A Guide to Planning Cycle Logistics Hubs* (2020). https://civitas.eu/sites/default/files/Cyclelogistics%20Hub%20Guide%20A5%20English.pdf

[95] City of Calgary, "Calgary Bikeways," June 8, 2025. https://data.calgary.ca/Transportation-Transit/Calgary-Bikeways/yigb-2xmq

through census data[96] and land use designations[97]), and proximity to existing truck routes (Figure 3 and Table 8).

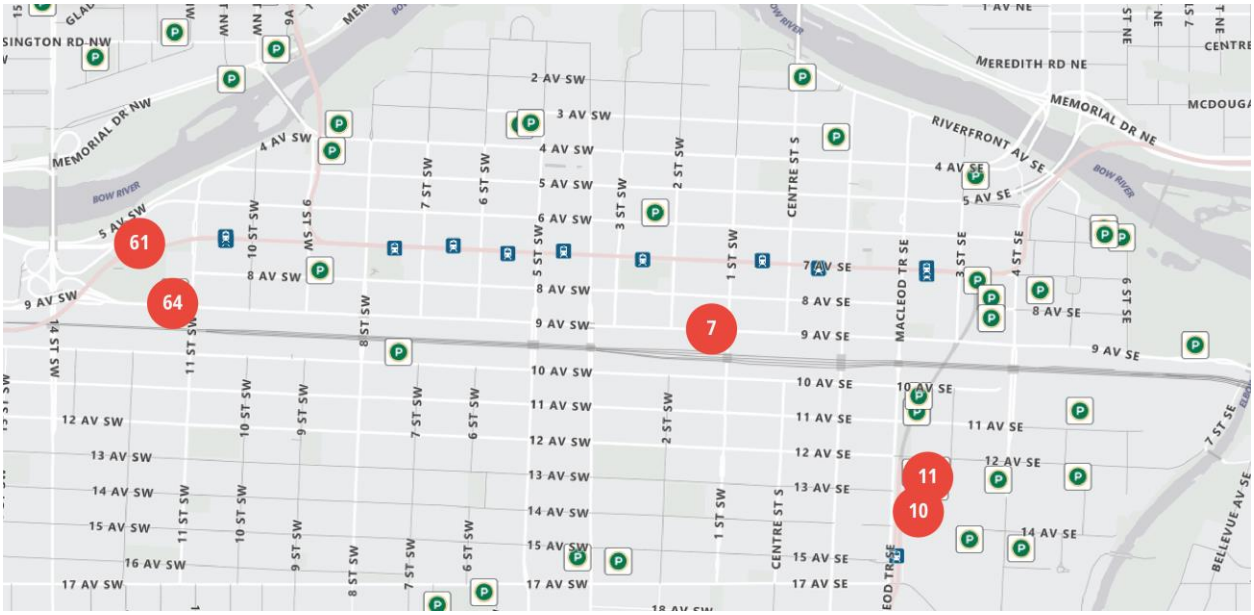

Figure 3. Potential microhub locations identified among downtown Calgary parking lots

Source: Calgary Parking,[98] with locations identified by Pembina Institute

Table 8. Characteristics of potential microhub locations

Lot location and address	Presence of cycling infrastructure	Degree of snow and ice clearing (priority level)	Demand for deliveries (census data and land use designation)	Proximity to existing truck routes
Lot 61 701 - 11 ST SW	Medium-high	High	Low-medium	Yes
Lot 64 825 - 11 ST SW	Medium-high	High	Low-medium	Yes
Lot 7 208 - 9 AV SW	Medium-high	High	Medium-high	Yes
CS Lots 10 and 11 314 13 Ave SE	Medium-high	Unknown	Medium	Yes

[96] City of Calgary, "Census by Community 2019," February 1, 2019. https://data.calgary.ca/Demographics/Census-by-Community-2019/jpwd-iaas

[97] City of Calgary, "Land Use Districts," June 8, 2025. https://data.calgary.ca/Base-Maps/Land-Use-Districts/mw9j-jik5

[98] Calgary Parking, "Parking lots and parkades," Downtown surface lots. https://www.calgaryparking.com/find-parking/lots.html

Recommendation 2: Expand cycle infrastructure and reevaluate design guidelines

Stakeholders noted the potential of cargo e-bikes as an effective transportation solution during peak travel times, particularly in high density areas. However, they also pointed out that the City's cycle network remains largely concentrated in the downtown core. While cargo e-bike operations would likely be most popular and effective in this area, Calgary's vast geography makes it unlikely that the cycle network could fully connect to the outlying suburbs. The City can address this by identifying targeted areas to strengthen connections between microhubs, businesses and residences — especially in equity deserving neighborhoods where cargo e-bikes can serve both business and personal needs. Direct investment in the City of Calgary's Pathway and Bike Network (5A) Program can enhance connectivity across different areas and encourage greater cargo e-bike adoption. This supports the objectives set out in the Calgary Climate Strategy – Pathways to 2050, which calls for increased investment in walking and wheeling infrastructure to enable the full implementation of the 5A network.[99]

The City should also engage with businesses, fleet operators, and equity-deserving businesses to evaluate the demand and desirability of the routes outlined in the 5A plan, ensuring they effectively support day-to-day operational needs. In addition, these consultations can facilitate the identification of optimal locations for microhubs, bike parking and charging infrastructure.

Moreover, stakeholders highlighted that the current bike paths are too narrow and not well-suited for cargo e-bikes. As such, the City should reevaluate its bike lane design guidelines, with a specific focus on minimum cycle lane widths. It can look to cities like London and New York that have recognized that infrastructure built for standard bicycles is often inadequate for cargo e-bikes, which are wider and longer. These cities have addressed this by incorporating wider lanes, passing zones, comfortable turning paths and cycle-specific speed signals into their cycling networks.[100] Well-designed infrastructure that increases rider safety can also lower liability risks for delivery companies and encourage more businesses to adopt cargo e-bikes.

Further, ongoing consultation with communities, including local groups, businesses and BIAs, is essential to ensure cycling infrastructure evolves in response to changing needs. For example, stakeholders highlighted in interviews that while the City has implemented several bike lanes, snow often accumulates in these lanes during winter months, hindering their usability. Continued community engagement can help identify such barriers and support more responsive, year-round infrastructure planning for cargo e-bikes.

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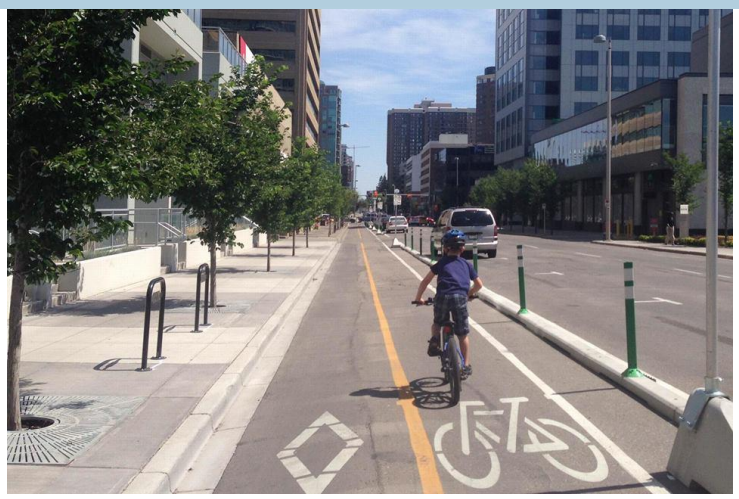
[99] *Calgary Climate Strategy – Pathways to 2050*.

[100] London, *Cargo bike action plan*, 17.

New York, *Charge Safe, Ride Safe*, 32.

Table 9. Example bike lane comparison

Location	Description	
Calgary	• Two-way cycle track allows travel in both directions on one side of the road. • Minimum width 3 metres.[101]	 Figure 4. Calgary 12 Avenue South cycle track Source: Beltline Neighbourhood Association[102]
New York	• Two-lane, single-direction protected bike lane segment allows passing. • 10-foot lane (3 metres) with 3 to 4-foot buffer zones.[103]	 Figure 5. New York 6th Avenue Manhattan bike lane Source: New York City DOT[104]

[101] City of Calgary, Complete Streets Guide (2014), 35-36. https://www.calgary.ca/content/dam/www/ca/city-clerks/documents/council-policy-library/tp021-complete-streets-policy.pdf

[102] Beltline Neighbourhoods Association, "Take Action: Let's Make 2nd Street SW Safe for Everyone." https://www.beltlineyyc.ca/cycle_tracks_on_2st

[103] New York City DOT, "NYC DOT Celebrates Safer Street Designs, Wider Bike Lanes Across Manhattan Avenues," media release, March 5, 2025. https://www.nyc.gov/html/dot/html/pr2025/safer-across-manhattan-aves.shtml

New York City DOT, *Street Design Manual* (2020), 70-71. NYCDOT-StreetDesignManual-2020-optimized.pdf

[104] "NYC DOT Celebrates Safer Street Designs, Wider Bike Lanes Across Manhattan Avenues."

Recommendation 3: Create cargo e-bike sharing program in business improvement areas

Stakeholders mentioned that cargo e-bike sharing programs are a useful way to move some delivery services onto bikes, building confidence in the system and generating a base of demand for further improvements. At the current state of technology, individual businesses only have a small proportion of goods that are suitable for cargo e-bike delivery, and the need for cargo e-bikes may also be unpredictable. It is thus more convenient to arrange for all their goods to be transported by van. Correspondingly, logistics companies are reluctant to employ cargo e-bikes if demand is unpredictable and scattered across multiple areas, making it difficult to use them cost-effectively.

One possible solution is a cargo e-bike sharing program hosted by BIAs. In this program, BIAs would own and operate one or two cargo e-bikes, giving businesses the ability to use them as needed. This would aggregate the demand for cargo e-bike deliveries from businesses in the area, justifying the operation and allowing businesses to be flexible with their use of cargo e-bikes. Such an approach builds confidence in the system by allowing customers to experience the use of cargo e-bikes, facilitating their ability to experiment without having to make large capital investments. Because BIAs serve a large variety of businesses in their area, they can better achieve economies of scale and push for consistent use of the bikes.

Implementing this policy would require working closely with BIAs, identifying their infrastructure requirements and providing support where necessary. The City can publicize the pilot scheme and ask BIAs if they would be willing to participate, providing an easy-to-follow resource for the pilot. Monitoring and evaluation processes would also be necessary to determine utilization rates and the factors behind success or failure. An iterative process can also determine ways in which the program can be scaled.

Recommendation 4: Start a cargo e-bike pilot program

Several interviewees expressed support for pilot programs to better understand the viability and business case for cargo e-bike delivery in Calgary. Given the growing demand for goods delivery, and the corresponding increase in freight vehicles, the City should identify logistics companies willing to participate in a cargo e-bike pilot. This approach aligns with the Calgary Goods Movement Strategy launched in 2018, which promotes partnering with couriers to pilot cargo bikes for last-kilometre delivery in urban areas.[105]

[105] *The Calgary Goods Movement Strategy,* 31.

Additionally, stakeholders noted that transitioning to cargo e-bikes requires additional time and resources for activities such as bike procurement, delivery timing and route planning, which could hinder participation. To encourage involvement, the City should support companies in planning efficient delivery routes, securing bikes and launching the pilot program. One example is Boston's cargo e-bike delivery pilot program, Boston Delivers, where a cargo e-bike delivery operator was contracted to provide the bikes, manage deliveries and oversee logistics.[106] Another example is Toronto's Cargo e-bike pilot program, which has generated useful data and helped the city and businesses understand how to operate cyclelogistics.[107]

A crucial element of the pilot will be to encourage data-sharing, monitoring and evaluation as much as possible. This will ensure that other companies can learn from the pilot and minimize the need to re-invent the wheel, while building confidence in the practice. It will also enable the city to better plan for future opportunities and support the sustainable expansion of cargo e-bike operations.

Recommendation 5: Facilitate cyclelogistics awareness and knowledge-building campaigns

According to stakeholders, Calgary's car dependency has contributed to an information gap around cargo e-bikes, potentially leading to uneven levels of support across the city. Many potential businesses or customers are simply unaware of the option or lack the know-how to integrate cargo e-bikes into their operations. Stakeholder mapping can help the City develop targeted outreach strategies tailored to different communities. Such an initiative would also support the City's 2018 Electric and Low-Emissions Vehicle Strategy goal to collaborate with the private sector and non-profits in developing an electric vehicle education program for the public and businesses.[108]

Additionally, stakeholders emphasized that businesses would benefit from clearer guidance on transitioning to cargo e-bikes, as many lack an understanding of important considerations such as cost, bike capacity, delivery logistics and operational needs. To support this shift, the City can partner with a cyclelogistics business to develop and distribute a comprehensive cargo e-bike guide for businesses that outlines key factors such as implementation steps, infrastructure requirements, appropriate use areas and supported manufacturers. This could include the microhub guide mentioned in Recommendation 1 above.

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[106] Amanda Belles, "E-Cargo Bikes: Strategies for Municipal Delivery Transition," *Metropolitan Area Planning Council*, September 30, 2014. https://www.mapc.org/resource-library/e-cargo-bikes/

[107] City of Toronto, *Cargo E-Bike Pilot (*2021). https://www.toronto.ca/legdocs/mmis/2021/ie/bgrd/backgroundfile-173616.pdf

[108] *Calgary's Electric and Low-Emissions Vehicles Strategy,* 20.

The guide could be integrated into a larger portal and information hub, where companies can access resources on transitioning to cargo e-bikes and receive ongoing updates from the City. Boston's Zero Emission Vehicle Roadmap stands as a strong example, detailing several ways to promote e-bikes, including helping small businesses and delivery services adopt e-bikes through education and outreach.[109]

Furthermore, the City of Calgary should lead by example by integrating cargo e-bikes into its own operations and showcasing them to the public. Cities like Vancouver have shown leadership by adopting low-impact approaches for municipal services and deliveries, while Montreal is modernizing its fleet by replacing aging subcompact municipal vehicles with electric models.[110]

Recommendation 6: Amend bylaws, regulations and standards to facilitate cargo e-bike operations

Consistent engagement with fleets and businesses is essential to ensuring that policy measures for cargo e-bike adoption are efficient and appropriate. Complex and unclear regulations around cargo e-bikes can discourage business participation. During interviews, companies highlighted ongoing confusion around liability, parking regulations and bike laws specific to cargo e-bikes. To address these concerns, the City should amend its bylaws and update zoning regulations to establish consistent rules for parking, sidewalk access, loading zones and microhub placement. These changes would help standardize training and support the scaling of cargo e-bike operations.

In addition, the City should consider infrastructure design standards that improve access in high-priority areas. Stakeholders suggested items such as clearer bike signage, delivery-friendly parking, electrical wiring options and heated microhubs with charging infrastructure as possible options. This complements Calgary's 2020 Municipal Development Plan, which emphasizes enabling mobility policy through convenient, high-quality parking locations for bikes and other zero-emission vehicles.[111] Similarly, the 2020 Calgary Transportation Plan highlights the need for a comprehensive curb management strategy.[112]

Moreover, the City should establish supportive enforcement practices and evaluation measures to ensure that cargo e-bikes are integrated safely and effectively. These could include implementing safety standards, requiring proper load distribution and regular maintenance,

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[109] Boston, *Zero-Emission Vehicle Roadmap,* 23.

[110] Vancouver, *Transportation 2040 Plan,* 54. https://vancouver.ca/files/cov/Transportation_2040_Plan_as_adopted_by_Council.pdf

Montreal, *Transportation Electrification Strategy 2021-2023,* 31.

[111] Calgary, *Municipal Development Plan,* 92.

[112] *Calgary Transportation Plan,* 50.

designating dedicated parking and loading zones and setting speed limits for cargo e-bike riders. Clear guidelines will also support businesses by increasing safety for both delivery companies and bike operators, thereby reducing liability concerns. They can also inform future adaptations of cargo e-bike systems, ensuring access for loading and maintaining unobstructed routes in high traffic areas as the market evolves. For instance, New York City has designated "green loading zones" reserved for specific vehicle types to incentivize electric vehicle and cargo e-bike adoption.[113]

5.2 Implementation roadmap

The City of Calgary can take a phased approach to implementing these recommendations, working with stakeholders to obtain feedback and data on pilots before scaling up the proposal (Figure 6).

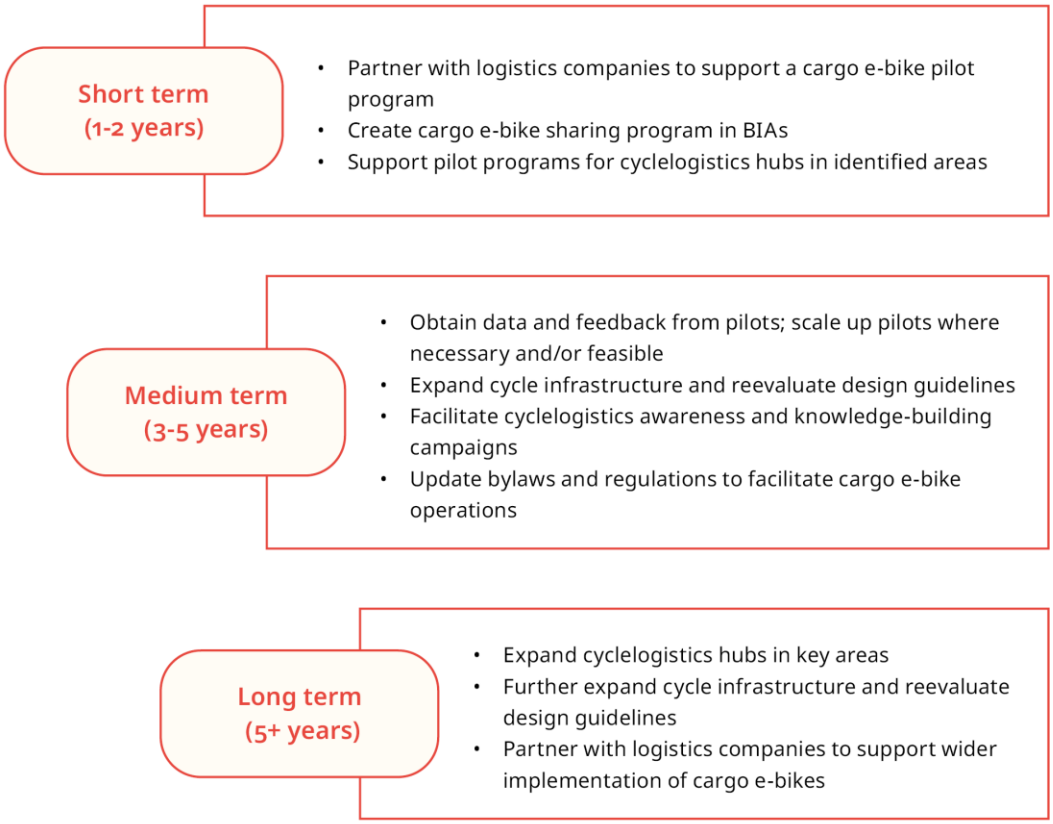

Figure 6. Suggested timeline to implement cyclelogistics action plan

[113] Maxner, *NYC Zero-Emission Urban Freight and Green Loading Zone Market Research*.

Appendix A. Jurisdictional scan

City	Strategy	Description	Key Actions and Sustainable Mode Targets
North America			
New York City	Charge Safe, Ride Safe: NYC's Electric Mobility Action Plan (2023)	*This plan is not specific to goods movement*. It outlines challenges and key actions to support New York's transition to safe and legal e-micromobility.	Key actions that relate to goods movement by bike include: • Support a first-of-its-kind hub program that uses existing infrastructure to provide a place to rest and recharge for delivery workers — including charging for e-bikes. • Update and pilot street design to include wider or multiple lanes, passing zones, bike speed signal timing progressions and bike boulevards. • Improve curbside policies to reduce double-parking; increase parking for different uses and cargo bike loading zones.
	PlaNYC (2023) Getting Sustainability Done	*This plan is not specific to goods movement.* It lays out climate related risks and actions to address these challenges and build a cleaner, greener and more just city.	Key actions that relate to goods movement by bike include: • Seek federal funding to create an incentive program for businesses to purchase cargo bikes and work with City and state legislative partners to remove barriers to deployment. • Create next generation bike lanes and facilities, including thousands of secure bike parking spots.
	Delivering New York: A Smart Truck Management Plan for New York City (2021)	*This plan is specific to goods movement.* It seeks to help manage truck movements to ease congestion and create innovative opportunities for safe deliveries.	Key actions that relate to goods movement by bike include: • Evaluate the Commercial Cargo Bike Pilot Program and explore longer-term solutions for accommodating pedal-assist cargo bikes and the companies wanting to use them on NYC streets. • Investigate the feasibility of designating "green loading zones," dedicated to particular vehicle types and/or reserved for use by particular companies to incentivize electric vehicle and pedal-assist cargo bike adoption.

			Key sustainable mode targets include: • Work to increase the adoption of zero-emission vehicles for a market share of 20% of deliveries in Manhattan Central Business District by 2030 to meet GHG reduction goals.
	Delivering Green: A Vision for a Sustainable Freight Network Serving New York City (2021)	*This plan is specific to goods movement.* It outlines five steps the City will take to fundamentally restructure freight distribution and create a sustainable system for moving goods.	Key actions that relate to goods movement by bike include: • Create a permanent cargo bike program through the promulgation of rules allowing for permit system, with a goal of growing enrollment in the Commercial Cargo Bike Pilot Program from 250 bikes in 2021 to 2,500 bikes by 2026. • Work alongside New York City Economic Development Corporation to explore multimodal freight operation at underutilized landings, looking to support barge and/or freight ferry to cargo bike and other sustainable delivery methods. Key sustainable mode targets include: • Shift 25% of last-mile freight deliveries from trucks to small, sustainable delivery methods by 2040.
	NYC Streets Plan (2021)	*This plan is not specific to goods movement.* It seeks to support the future of NYC streets, public realm and transportation landscape.	Key actions that relate to goods movement by bike include: • Develop “cargo bike only” curb regulations. • Support allowing all state-compliant e-cargo bikes, consistent with local safety protocols. • Advocate to update state law to allow the use of more types of cargo bike.
Boston	Zero-Emission Vehicle Roadmap (2020)	*This plan is not specific to goods movement.* It establishes targets and actions to support widespread adoption of electrification and access to charging.	Key actions that relate to goods movement by bike include: • Support small businesses and delivery services to incorporate cargo bikes in their fleet through education and outreach.

Seattle	Curbside Management Climate Plan (2023)	*This plan is specific to goods movement.* It works to create strategic policy changes at the curb focused on addressing the climate emergency.	Key actions that relate to goods movement by bike include: • Test and explore pilots that support e-cargo bikes, climate-friendly loading and mobility hubs. Priorities for 2023 include pilot development, continued stakeholder engagement and potential launch of pilot offerings. • Evaluate pay-per-use structures for loading zones, different pricing structures based on use cases, and automated payment systems.
	Seattle Transportation Plan – Part 1 (2023)	*This plan is not specific to goods movement.* It identifies ways to improve safety, equity and sustainability of Seattle's transportation system.	Key actions that relate to goods movement by bike include: • Update private development bike parking guidelines and code requirements for charging and storage to support the use of e-bikes, larger cargo bikes and scooters. • Collaborate with private sector partners on a pilot and programs to accelerate the shift of freight trips to low- and zero-emission vehicles, such as e-cargo bikes. • Adapt streets for new and evolving forms of mobility, such as commercial cargo bikes and low-speed electric vehicles.
	Transportation Electrification Blueprint (2021)	*This plan is not specific to goods movement.* It is an initial step toward advancing Seattle's commitment to reducing pollution from the transportation sector.	Key actions that relate to goods movement by bike include: • Explore equitable road pricing as a funding mechanism to increase zero-emission trips taken. • Explore pathways to permit or track goods delivery in Seattle to create a baseline for 30% of goods delivery to be electric by 2030. • Partner with goods delivery companies to pilot new electric delivery modes and bring more electric delivery options to market. • Dedicate one or more Seattle streets or blocks to walking, biking, electric mobility and electric goods delivery while closing it to general purpose internal-combustion engines. Key sustainable mode targets include: • Achieve 30% of goods delivery being zero-emissions by 2030.

Ottawa	Transportation Master Plan – Movement of Goods (2022)	*This plan is specific to goods movement.* Outlines policies to support safe, livable streets and healthy communities while ensuring Ottawa's economy can grow and thrive.	Key actions that relate to goods movement by bike include: • Enable bylaws, curbside management practices and zoning that permits small urban distribution centres and stand-alone pick-up facilities. • Review design standards for truck routes to balance requirements for heavy trucks and design objectives for pedestrians and cyclists.
	Transportation Master Plan – Part 1 (2021)	*This plan is not specific to goods movement.* Outlines policies, facilities and services to guide transportation planning and operations.	Key actions that relate to goods movement by bike include: • Continue to explore opportunities to provide shared bicycle, e-bike and e-cargo bike services through partnerships with private companies. • Update the zoning bylaw to require an adequate quantity of high-quality bicycle parking in new developments suitable for a range of different bike types. • Review opportunities to use smaller and safer vehicles for City operations.
Montreal	Transportation Electrification Strategy 2021–2023	*This plan is not specific to goods movement.* It aims to accelerate the electrification of personal and public vehicles and tackle emerging challenges of electric mobility.	Key actions that relate to goods movement by bike include: • Intensify efforts to encourage electrification of urban freight transportation by ensuring the sustainability of the Colibri cargo bike pilot project and set up new local urban logistics spaces to serve a larger territory and more boroughs. • Replace all subcompact municipal vehicles that have reached the end of their useful life with electric subcompact models, including bikes. • Evaluate the relevance of acquiring e-bikes for parking enforcement officers and Agence de mobilité durable maintenance operations, and conduct a pilot project. • Have Montreal serve as a testing ground to help businesses carry out technological validation or commercial demonstration of products linked to electric mobility by conducting at least one experimental project for electric or low-carbon rolling stock prototype; continue testing electric self-driving shuttles.

			• Work on the introduction of the first Low Emission Zone in Montreal and launch public consultation to specify terms. Key sustainable mode targets include: • 500,000 parcels delivered each year from local urban logistics spaces using electric transportation modes. • Electrify 100% of the City's compact vehicles and prioritize the use of electric vehicles to decarbonize the remaining municipal fleet.
Guelph	Transportation Master Plan (2022)	*This plan is not specific to goods movement.* It lays out how the city will build out and operate its transportation system.	Key actions that relate to goods movement by bike include: • Prepare a comprehensive Goods Movement Strategy that considers the potential impact of emerging technology and modes, including cargo bikes. • Consider trucking needs, the inclusion of on-street loading areas and separated cycling and micromobility facilities when constructing and rehabilitating roads. • Research effective curbside management practices and technologies to balance and optimize demand.
Portland	2040 Portland Freight Plan (2022)	*This plan is specific to goods movement.* It addresses how to reduce emissions from the freight sector.	Key actions that relate to goods movement by bike include: • Incentivize and address regulatory barriers to use cargo bikes in denser urban areas for first- and last-mile delivery, particularly downtown and inner Eastside. • Support cargo bike developments with expansion of bike-pedestrian infrastructure. • Work with the private sector to disseminate information on cargo bikes and establish peer knowledge exchanges. • Encourage the use of microhubs by coordinating with small package integrators (such as UPS and FedEx) and designing curbside locations for this activity.
City of North Vancouver	Mobility Strategy (2022)	*This plan is not specific to goods movement.* It will guide the City in planning, designing, maintaining, operating and	Key actions that relate to goods movement by bike include: • Improve goods movement reliability and urban deliveries; enable microhubs, delivery lockers and more dedicated loading and unloading spaces across the city.

		investing in the transportation system over the next decade.	• Explore the feasibility of a delivery microhub program that enables right-sized delivery vehicles for short-distance trips. • Explore the feasibility of a permit system for commercial and delivery vehicles that incentivizes use of low- or zero-emission vehicles (including cargo bikes) or dissuades the use of traditional internal combustion engines. • Ensure micromobility parking spaces are designed to accommodate e-bikes and cargo bikes. • Reduce the amount of vehicle parking that developers must provide in new buildings and increase the amount of parking for sustainable modes, including increasing minimum requirements for bike parking, and require more horizontal bike parking and charging points to accommodate increased use of cargo bikes and e-bikes.
Vancouver	Transportation Demand Management Action Plan 2021–2025 (2021)	*This plan is not specific to goods movement.* It guides program development to reduce the number of private vehicle trips.	Key actions that relate to goods movement by bike include: • Support and coordinate initiatives that increase awareness of cargo bike usage. • Develop and share useful resources that encourage and assist employers/organizations to use cargo bikes or other shared fleet vehicles. • Advocate to provincial and federal governments for an e-bike rebate program not linked to the disposal of motor vehicles. • Develop and implement a public e-bike incentive program.
	Transportation 2040 (2012)	*This plan is not specific to goods movement.* It sets a long-term strategic vision for transportation, land use decisions and public investments.	Key actions that relate to goods movement by bike include: • Adopt planning and design guidelines to support a cycling network of routes that accommodate unconventional bikes, such as cargo bikes, delivery tricycles, etc. • Support regulations, incentives and strategies to facilitate efficient low-impact goods and services movement, including consideration of flexible loading options for cycle-based and other small-scale vehicles and the right-sizing of service and delivery vehicles.

			• Continue to demonstrate corporate leadership in procurement and operations by using low-impact approaches for City-related services and deliveries.
Toronto	Freight and Goods Movement Strategy (2020)	*This plan is specific to goods movement.* It details recommendations to provide a goods movement system that is safe, reliable and sustainable.	Key actions that relate to goods movement by bike include: • Determine the required regulatory changes to promote motor assisted cargo bike operation and parking on roads. • Identify safety considerations and infrastructure needs, including security, storage and electrical charging stations, to support the adoption of cargo bikes. • Examine the feasibility of implementing commercial vehicle low-emission zones.
Europe			
Copenhagen	The City of Copenhagen's Bicycle Strategy 2021–2025	*This plan is not specific to goods movement.* It highlights steps required to reach Copenhagen's ambitious goals for increasing the modal share of bikes.	Key actions that relate to goods movement by bike include: • Pilot projects for cargo bike parking will be replaced by standard solutions developed in collaboration with businesses, homeowner associations and developers. By 2025, there will be excellent parking facilities for cargo bikes outside of homes, institutions and shops. • Reduce travel times on bikes to ensure competitiveness with other forms of transport. By 2025, bikes will be the fastest form of transport in many parts of the city and travel times will be reduced by 15%, relative to 2010.
Dublin	Greater Dublin Area Transport Strategy 2022–2042 (2023)	*This plan is not specific to goods movement.* It sets out the framework for investment in transport infrastructure and services over the next two decades.	Key actions that relate to goods movement by bike include: • Prepare public cycle parking strategies to ensure there is sufficient on-street and off-street parking, including spaces for cargo bikes and other non-standard bike designs. • Examine the case for urban and micro-consolidation centres to reduce last-mile trips made by larger goods vehicles. • Explore the feasibility of out-of-hours delivery and service using low-noise vehicles and imposing planning conditions where appropriate.

	Dublin City Development Plan 2022–2028 (2022)	*This plan is not specific to goods movement.* It details how the city will guide growth and development.	Key actions that relate to goods movement by bike include: • Support the repurposing of multi-story car parks for alternative uses such as central mobility hubs providing high density bike parking, shared mobility services, "last mile" delivery hubs and recreational uses. • Promote and encourage the development of microhubs and distribution centres.
London	Cargo Bike Action Plan (2023)	*This plan is specific to goods movement.* It focuses on promoting and enabling the growth of cargo bikes to make them London's leading option for last-mile freight.	Key actions that relate to goods movement by bike include: • Monitor movements by cycle type to improve understanding of cargo bike trips, identify usage patterns and project future growth. • Continue to work with boroughs and developers to identify opportunities for short-stay parking facilities for bikes. • Work with industry to understand their micromobility hub requirements and identify land that could be used for freight and micromobility hubs. • Work with operators, boroughs, business improvement districts and landowners to support multimodal trials and other initiatives that enable integrated logistics modes, including water and rail. • Update and revise cargo bike safety guidance for operators and riders to provide advice on safety and operating practices. • Use procurement as a policy lever for suppliers to support sustainable last-mile delivery and cargo bikes. • Promote cargo bikes as preferred mode when planning or supporting borough schemes, including Low Traffic Neighbourhoods and borough-led vehicle emissions-based schemes. • Work with national policy development to explore increasing load capabilities available to electrically assisted vehicles and cargo bikes, regulations limiting power to electrically assisted power cycles, congestion charging and emissions-based restrictions. Key sustainable mode targets include:

			• By 2041, 80% of journeys in London are to be made by walking, cycling and public transportation. • Reduce the number of lorries and vans entering central London during the morning peak by 10% by 2026.
	Cycling Action Plan 2 (2023)	This plan is not specific to goods movement. It sets out how London will expand its cycle network and ensure cycling is a feasible transportation option for all.	Key actions that relate to goods movement by bike include: • Work with construction and utility companies to educate them on temporary traffic management to ensure streets are accessible, including for people using larger cycles such as cargo bikes. • Install more cycle parking in town centres and high streets, including spaces for larger cycles. Test new cycle-stand designs and signs for cargo bike users. • Support the growth of cycle freight by implementing London's Cargo Bike Action Plan.
	Freight and Servicing Action Plan (2021)	This plan is specific to goods movement. It details future policies and actions to support safe and efficient freight operations.	Key actions that relate to goods movement by bike include: • Share knowledge and deliver workshops to enable businesses to take action to reduce the impact of their deliveries and servicing. • Identify small parcels of unused land within city real estate for distribution centres and collection points and encourage public sector organizations to do the same.
Westminster City	Freight, Servicing, and Deliveries: Strategy and Action Plan 2020–2040	This plan is specific to goods movement. It seeks to reduce the number of vehicle movements and their emissions and improve safety.	Key actions that relate to goods movement by bike include: • For new commercial developments, require provision of electric vehicle charging and floorspace to provide urban depots, micro-distribution hubs and cargo bike storage and facilities. Progress will be measured by increased use of close-proximity urban delivery points for last- and first-mile delivery and collection by zero-emission alternatives. • For new commercial developments using consolidation, require all trips be undertaken using zero-emission vehicle fleets (cargo bikes, etc.) Progress will be measured by the reduction in trips undertaken by conventional petrol/diesel vehicles and growth in zero-emission alternatives.

			• Promote the use of space in Westminster City Council and other public sector estates for urban depots, micro-consolidation and e-cargo bike storage and charging. Progress will be measured by enhanced use of suitable sites for urban depots and micro-distribution, meeting current and growing demand. • Develop and implement a cargo bike pilot and trial, with scheme riders receiving free training and support from a partner. • Consider embedding cargo bike schemes in the City Council's wider supply chains and across its services. Key sustainable mode targets include: • The absolute number of freight and servicing delivery vehicles in Westminster reduced by 80% by 2040. • All trips made by freight, servicing and delivery vehicles in Westminster to be zero emission by 2040.
City of Glasgow	Glasgow's Active Travel Strategy 2022–2031	*This plan is not specific to goods movement.* It addresses barriers to walking, wheeling and cycling, and barriers that prevent people from adopting cycling.	Key actions that relate to goods movement by bike include: • Support trials of e-cargo bikes and support their increased use through the design of the City Network and identification of local delivery hubs. • Establish safe cycle parking and ensure adequate parking for adaptive and cargo cycles as a standard. • Support projects and events offering organizations and the public an opportunity to trial an e-cargo bike for free. • Support the development of e-cargo bike lending libraries across the city to include a range of models with different carrying capacities and help users with training. • Investigate ways to increase capacity in the maintenance of e-cargo bikes.
Rotterdam	Moving Towards Zero Emission City Logistics in Rotterdam in 2025 (2019)	*This plan is specific to goods movement.* It looks to develop mid- to long-term solutions and marks a breakthrough in the transition to emissions-free city logistics.	Key actions that relate to goods movement by bike include: • Continue offering current incentives, including a waiver for evening deliveries within pedestrian areas for emissions-free goods transport and subsidies for zero-emission vans.

			• Develop and sign an agreement with the logistics sector to introduce a zero-emission city logistics zone by 2025, with a transitional model for each subsegment (waste, express/parcels, general freight, facilities/services, etc.).
Barcelona	Municipal Strategy on Urban Goods Distribution 2030	*This plan is specific to goods movement.* It seeks to make urban distribution more efficient and sustainable by proposing goals to halve emissions from delivery vehicles by 2030.	Key actions that relate to goods movement by bike include: • Increase the number of urban goods distribution centres and collection point pilot projects in main municipal car parks and make full use of programming that acquires ground-floor establishments for introducing urban goods distribution centres. • Define temporary windows for goods deliveries by vehicles, in order to concentrate deliveries within these time periods and promote cyclelogistics at all other times. • Work with the General Traffic Directorate to approve small new vehicles for goods deliveries, starting with e-scooters. Key sustainable mode targets include: • Halve emissions from delivery vehicles by 2030, with 33% of deliveries made using urban goods distribution centres. • Multiply the number of bikes and delivery bikes by ten and have an urban delivery service on the rail network.
Berlin	Integrated Commercial Transport Concept 2021	*This plan is specific to goods movement.* It forms the planning basis for guaranteeing a functioning, environmentally and city-friendly commercial transport system in Berlin.	Key actions that relate to goods movement by bike include: • Advance the recording and planning around sources, sinks and hubs of commercial traffic, including providing information about areas that can be used flexibly and on short notice for depots on public and non-public lands. • Incorporate experiences and lessons learned from the pilot on the cooperative use of micro-depots for cargo bikes by the courier, express and parcel industry (KoMoDo) in further planning and follow-up projects. • Promote the joint use of data in commercial transactions, including data on suitable cycle path infrastructure for the use by cargo bikes and information on areas that can be temporarily used as transfer points.

			• Continue to support the procurement of cargo bikes for commercial use through a subsidy purchase program.
Oceania			
Adelaide	Electric Vehicle Charging Infrastructure Transition Roadmap (2023)	*This plan is not specific to goods movement.* It explores mechanisms through which the city can influence increased e-bike uptake.	Key actions that relate to goods movement by bike include: • Create a low-stress cycling network by building out cycling infrastructure that is physically separated from vehicle traffic. • Provide secure parking on-street by converting car parking spaces to bike parking. Consider parking for larger bikes, including cargo bikes. • Encourage businesses and strata corporations to install e-bike charging and consider the provision of secure on-street parking in areas that lack space for bike facilities. • Monitor the uptake and effectiveness of e-bike incentives offered throughout the city.
Melbourne	Transport Strategy 2030 (2019)	*This plan is not specific to goods movement.* It seeks to outline supports needed to sustain an increased share of trips by walking, cycling and public transport.	Key actions that relate to goods movement by bike include: • By 2030, the City will trial technology and enable innovative use of curbside space, including micromobility. • Advocate to the Victorian government to increase the maximum power output for cargo e-bikes allowing them to safely carry heavier loads. • Advocate to the Victorian and Australian government to subsidize e-bikes. • Review of road rules to support safe and efficient cycling, including a review of power and speed restrictions on e-bikes and cargo e-bikes. • Support the trialling of a freight consolidation centre and innovative, efficient and low-impact solutions to last-kilometre delivery, waste removal and servicing.
	Last Kilometer Freight Plan (2016)	*This plan is specific to goods movement.* It includes actions and recommendations	Key actions that relate to goods movement by bike include:

		specifically targeting the last leg of freight deliveries, where congestion is the highest.	• Support cargo bike delivery among businesses by funding and undertaking trials and sharing lessons learnt from trials and pilot projects.
Sydney	Cycling Strategy and Action Plan 2018–2030 (2023)	*This plan is specific to goods movement.* It includes actions to make bicycle transport easier and safer.	Key actions that relate to goods movement by bike include: • Consider all bike network users, including those on cargo bikes, e-bikes and trishaws, in the design of infrastructure. • Provide information and support for workplaces wanting to set up a bike fleet or encouragement programs. • Work with the bike industry to increase the range of bikes available to meet varying needs. • Support or encourage bike-based or related enterprises or activities. Work with operators to maximize benefits and outcomes, including bike share and food delivery. Key sustainable mode targets include: • Have 10% of all trips in the city made by bike in 2030.

Appendix B. Interview questions

Interview guide: *Logistics and delivery companies, delivery clients*

Introduction *Welcome participants, gather input on experience with delivery by cargo e-bike and answer outstanding questions.*
Thank you for agreeing to participate in this interview — your insights will be helpful in guiding the future of moving goods and services by cargo e-bike in the city of Calgary. To start we would like to ask you a general scoping question. Does your company currently use e-bikes for delivery? If not, would your company consider using cargo e-bikes at some point in the future? On a scale of 1 to 10, can you rate your degree of confidence in adopting cargo e-bikes for goods delivery?
Barriers *Identify barriers (real or perceived) by firms in implementing delivery by cargo e-bike and each barrier's magnitude of impact.*
We will now discuss barriers that impact the implementation of delivery by cargo e-bike. These may include financial, technological, infrastructure, safety and security, informational, operational, attitudinal and geographical barriers. We also invite any other feedback on barriers that we may not cover in the questions we have prepared.
Financial *(cost of e-bikes and associated needs)* Does your company currently face financial barriers that may impact the implementation of delivery by cargo e-bike? To what extent is delivery by cargo e-bike impacted by the following factors: • The current cost of cargo e-bike models available? • Availability of incentives or rebates (e.g., purchase subsidies)? • The cost of maintaining a fleet of cargo e-bikes? • Risk of loss or cost of insurance against loss? • Cost of a potential microhub/consolidation centre?
Regulatory *(permits, business licenses, land use, etc.)* Does your company currently face regulatory barriers that may impact the implementation of delivery by cargo e-bike? To what extent is delivery by cargo e-bike impacted by the following factors: • Licenses, permits and insurance coverage required by the City? • Land use and zoning bylaws? Specifically for logistics hubs or transfer facilities. • Use of travel lanes or designated use lanes (bike lanes, sidewalks)? Enforcement of stopping or no stopping signage?

Technological *(cargo e-bike specifications, quality, etc.)*

Does your company currently face technological barriers that may impact the implementation of delivery by cargo e-bike?

To what extent is delivery by cargo e-bike impacted by the following factors:

- Sourcing cargo e-bike models that fit the needs of your company?
- The quality of cargo e-bike models on the market?
- Cargo e-bike payload capacity and/or ability to handle bulky items?
- Cargo e-bike size, weight and/or maneuverability?
- The range a cargo e-bike can travel on a single charge?
- The speed at which a cargo e-bike can travel?

Infrastructure *(inadequate access to cycle paths, parking, storage, etc.)*

Does your company currently face infrastructure barriers that may impact the implementation of delivery by cargo e-bike?

To what extent is delivery by cargo e-bike impacted by the following factors:

- The current network of cycling paths' ability to access destinations?
- The current network of cycling paths' width/design?
- Access to designated parking areas and/or curb space?
- Access to micro-depots and/or the location of these facilities?
- Locations for recharging cargo e-bikes while in service?
- Certain road conditions (e.g., potholes, snow and debris clearing, terrain etc.)?

Are there specific areas/locations in the city where you think that a microhub or parking facility would be best placed to support cargo e-bike delivery?

Safety and Security *(collisions with other road users, pedestrians, etc.)*

Does your company currently face safety and security barriers that may impact the implementation of delivery by cargo e-bike?

To what extent is delivery by cargo e-bike impacted by the following factors:

- Concerns about road collisions with other vehicles, bikes and/or pedestrians?
- Concerns about dangerous driving among other road users?
- Obstructions to cycling lanes?
- Concerns about potential theft of cargo e-bikes and/or packages?
- The cost of insurance and/or replacement costs in the event of theft or damage?

Informational *(access to data, knowledge transfer)*

Does your company currently face informational barriers that may impact the implementation of delivery by cargo e-bike?

To what extent is delivery by cargo e-bike impacted by the following factors:

- Access to data measuring outcomes of deliveries by cargo e-bike (e.g., efficiency, costs)?
- Understanding the correct licenses, permits and insurance coverage for operating a cargo e-bike?

Operational *(trained riders, management, etc.)*

Does your company currently face operational barriers that may impact the implementation of delivery by cargo e-bike?

To what extent is delivery by cargo e-bike impacted by the following factors:

- The distance of delivery routes serviced by your company?
- Staff with training or operational comfort to deliver by cargo e-bike?
- Management know-how to set up necessary infrastructure and/or procurement of cargo e-bikes?
- Access to and/or training for technicians to service cargo e-bikes?

Attitudinal *(reputation, perceptions, etc.)*

Does your company currently face attitudinal barriers that may impact the implementation of delivery by cargo e-bike?

To what extent is delivery by cargo e-bike impacted by the following factors:

- A general dislike or preference against cargo e-bikes?
- The desire to have more sustainable operations and/or establish a sustainable reputation?
- Concerns about a bad reputation for being unsustainable or for poor reliability if using cargo e-bikes?

Geography *(weather, topography, etc.)*

Does your company currently face geographical barriers that may impact the implementation of delivery by cargo e-bike?

To what extent is delivery by cargo e-bike impacted by the following factors:

- Weather conditions (e.g., rain, snow, wind)?
- Topography (e.g., steep hills)?
- Temperature (e.g., cold, heat)?

Other

Are there other barriers that we have not yet discussed that impact the implementation of delivery by cargo e-bike?

Importance

Of the barriers discussed, which do you feel is the most significant barrier impeding delivery by cargo e-bike?

Comparison with current transport mode

Of the barriers that we have discussed, do any of these impact the delivery of goods using your current mode of transport (delivery vans/trucks)? If so, to what extent?

Potential solutions

Identify any potential solutions that can help firms overcome the discussed barriers.

Are there any solutions to the barriers that we have discussed that would encourage you to implement delivery by cargo e-bike?

Delivery vehicle options

Identify existing and emerging delivery vehicle options, other than cargo e-bikes, that could be used to deliver similarly sized loads carried by cargo e-bikes.

Are there other delivery vehicle options (other than cargo e-bike) that are currently available or in development that you are actively considering or would consider adopting?

If yes, please describe.

If not, would you consider adopting any of the following alternative delivery vehicle options:

- Electric delivery vans?
- Low-speed electric vehicles?
- Electric scooters and/or quads?
- Autonomous delivery robots?

Conclusion

Thank interviewees for participation, gather additional input and answer outstanding questions.

Thank you for taking the time to speak with us. Beyond what was discussed already, is there anything else you would like to share with us regarding cargo e-bike delivery?

We appreciate your participation!

Interview guide: *Government agencies*

Introduction

Welcome participants, answer outstanding questions.

Thank you for agreeing to participate in this interview — your insights will be helpful in guiding the future of cyclelogistics in the city of Calgary.

Before getting started, do you have any questions?

Barriers

Identify barriers in implementing cargo e-bikes for goods and services delivery in Calgary, along with potential solutions.

Now, we would like to discuss barriers that might impact the use of cargo e-bikes for goods delivery in Calgary. These may include financial, technological, infrastructure, safety and security, informational, operational, attitudinal and geographical barriers. We also invite any other feedback on barriers that we may not cover in the prepared questions.

Financial *(the cost of cargo e-bikes and associated needs)*

Do you think there are financial barriers that might impact the implementation or consideration of cargo e-bikes for goods delivery among businesses in Calgary?

To what extent might the following factors impact cargo e-bike implementation:

- The current cost of cargo e-bike models available?
- Availability of incentives or rebates (e.g., purchase subsidies)?
- Cost of a potential microhub/consolidation centre?

Regulatory *(permits, business licenses, land use, etc.)*

Do you think there are regulatory barriers that might impact the implementation or consideration of cargo e-bikes for goods delivery among businesses in Calgary?

To what extent might the following factors impact cargo e-bike implementation:

- Licenses, permits and insurance coverage required by the City?
- Land use and zoning bylaws?
- Use of travel lanes or designated use lanes (cargo e-bike lanes, sidewalks)? Enforcement of stopping or no stopping signage?
- Other city plans or strategies?

Technological *(barriers related to cargo e-bike technology)*

Do you think there are technological barriers that might impact the implementation or consideration of cargo e-bikes for goods delivery among government agencies and/or businesses in Calgary?

To what extent might the following factors impact cargo e-bike implementation:

- Sourcing cargo e-bike models that fit the needs of your department?
- The quality of cargo e-bike models on the market?
- Cargo e-bike payload capacity and/or ability to handle bulky items?
- Cargo e-bike size, weight and/or maneuverability?
- The range a cargo e-bike can travel on a single charge
- The speed at which a cargo e-bike can travel?

Infrastructure *(inadequate access to cycle paths, parking, storage, etc.)*

Do you think there are infrastructure barriers that might impact the implementation or consideration of cargo e-bikes for goods delivery among businesses in Calgary?

To what extent might the following factors impact cargo e-bike implementation:

- The current cycling path network's ability to access destinations?
- The current network of cycling paths' width/design?
- Access to designated parking areas and/or curb space?
- Access to micro-depots and/or the location of these facilities?
- Locations for recharging cargo e-bikes while in service?
- Certain road conditions (e.g., potholes, snow and debris clearing, terrain etc.)?

Are there specific areas/locations in the city where you think that a microhub or parking facility would be best placed to support cargo e-bike delivery?

Safety and Security *(collisions with other road users, pedestrians, etc.)*

Do you think there are safety and security barriers that might impact the implementation or consideration of cargo e-bikes for goods delivery among businesses in Calgary?

To what extent might the following factors impact cargo e-bike implementation:

- Road collisions with other vehicles,bikes and/or pedestrians?
- Obstructions to cycling lanes?
- Concerns about potential theft of cargo e-bikes and/or packages?
- The cost of insurance and/or replacement costs in the event of theft or damage?

Informational *(access to data, knowledge transfer)*

Do you think there are informational barriers that might impact the implementation or consideration of cargo e-bikes for goods delivery among businesses in Calgary?

To what extent might the following factors impact cargo e-bike implementation:

- Access to data measuring outcomes of deliveries by cargo e-bike (e.g., efficiency, costs)?
- Understanding the correct licenses, permit and insurance coverage for operating a cargo e-bike?

Operational *(trained riders, management, etc.)*

Do you think there are operational barriers that might impact the implementation or consideration of cargo e-bikes for goods delivery among businesses in Calgary?

To what extent might the following factors impact cargo e-bike implementation:

- Access to staff with cargo e-bike training or operational comfort using a cargo e-bike?
- Management know-how to set up necessary infrastructure and/or procurement of cargo e-bikes?
- Access to trained technicians to service cargo e-bikes?

Other

Are there other barriers that we have not yet discussed might impact the implementation or consideration of cargo e-bikes for goods delivery among businesses in Calgary?

Comparison with other transport modes

Of the barriers that we have discussed, do any of these impact the use of electrified delivery vans and trucks for goods delivery among businesses in Calgary?

What (if any) might be benefits from the deployment of electrified delivery vans and trucks for goods delivery in Calgary?

Jurisdiction to address identified barriers

Identify which barriers are within the jurisdiction of government, and which level of government would be best to address each particular barrier: municipal, provincial or federal.

Of the barriers we have discussed so far, which of these do you feel are within the jurisdiction of government to address?

- Financial
- Technological
- Infrastructure
- Safety and Security
- Informational
- Operational
- Geographical
- Other

Which level of government do you feel is best suited to address each of those barriers?

- Municipal
- Provincial
- Federal

Potential solutions
Identify any potential solutions that can help overcome the discussed barriers.
Are there any solutions to the barriers discussed that would encourage cargo e-bike implementation among government agencies and/or businesses in Calgary?
Conclusion
Thank interviewees for participation, gather additional input and answer outstanding questions.
Thank you for taking the time to speak with us. Beyond what was discussed already, is there anything else you would like to share with us regarding the implementation of cargo e-bikes? We appreciate your participation!

Interview guide: *Business improvement areas*

Introduction
Welcome participants, answer outstanding questions.
Thank you for agreeing to participate in this interview — your insights will be helpful in guiding the future of cyclelogistics in the city of Calgary. Before getting started, do you have any questions?
BIA bike activity
Assess the use of cargo e-bikes or bikes among business operating within the BIA.
Do you currently have businesses within your BIA that are using cargo e-bikes as part of their operations? In this case, we are referring to direct integration of cargo e-bike use within businesses, excluding cargo e-bike use that involves the gig economy (DoorDash, Uber Eats, bike messengers, etc.). *If the BIA does have businesses operating cargo e-bikes, then assess the extent to which this was supported:* • Was the BIA actively involved in the process of businesses within your chapter implementing cargo e-bikes in their operations? • If yes, then what if anything was done to directly support that? • If not, are you able to share what other factors may have supported the implementation of cargo - bikes among businesses within your BIA? Were there any barriers that needed to be overcome for businesses within your BIA to implement cargo e-bikes within their operations? • If yes, skip to next section. • If not, is there anything else you'd like to share with us about the process of businesses in your BIA integrating cargo e-bikes within their services? Or what the experience of bike use among businesses has been like within your BIA? *If the BIA does not have businesses operating cargo e-bikes, then assess perceived barriers:* • Given that businesses within your BIA are not actively using cargo e-bikes as part of their operations, are there any barriers that are preventing their use? • If yes, skip to next section.

- If not, is there anything else you'd like to share with us about the process of businesses in your BIA integrating cargo e-bikes within their services? Or what the experience of bike use among businesses has been like within your BIA?

Barriers

Identify barriers (real or perceived) by BIAs in implementing delivery by cargo e-bike and each barrier's magnitude of impact.

Regulatory *(permits, business licenses, land use, etc.)*

Based on your understanding, are there any regulatory barriers that have impacted the implementation of cargo e-bikes among businesses within your BIA?

To what extent have the following factors impacted cargo e-bike implementation:

- Licenses, permits and insurance coverage required by the City?
- Land use and zoning bylaws? In particular for logistics hubs or transfer facilities.
- Use of travel lanes or designated use lanes (bike lanes, sidewalks)? Enforcement of stopping or no stopping signage?
- Some sort of bylaw somewhere based on the vehicle you may put on the street? (Golf carts just got approved, some vehicle types maybe aren't used.)

Technological *(barriers related to cargo e-bike technology)*

Based on your understanding, are there any technological barriers that have impacted the implementation of cargo e-bikes among businesses within your BIA?

To what extent have the following factors impacted cargo e-bike implementation:

- Sourcing cargo e-bike models that fit the needs of the services you provide?
- The quality of cargo e-bike models on the market?
- Cargo e-bike payload capacity and/or ability to handle bulky items?
- Cargo e-bike size, weight and/or maneuverability?
- The range a cargo e-bike can travel on a single charge?
- The speed at which a cargo e-bike can travel?

Infrastructure *(inadequate access to cycle paths, parking, storage, etc.)*

Based on your understanding, are there any infrastructure barriers that have impacted the implementation of cargo e-bikes among businesses within your BIA?

To what extent have the following factors impacted cargo e-bike implementation:

- The current network of cycling paths' ability to access destinations?
- The current network of cycling paths' width/design?
- Access to designated parking areas and/or curb space?
- Access to micro-depots and/or the location of these facilities?
- Locations for recharging cargo e-bikes while in service?
- Certain road conditions (e.g., potholes, snow and debris clearing, terrain etc.)?

Are there specific areas/locations in the city where you think that a microhub or parking facility would be best placed to support cargo e-bike delivery?

Safety and Security *(collisions with other road users, pedestrians, etc.)*

Based on your understanding, are there any safety and security barriers that have impacted the implementation of cargo e-bikes among businesses within your BIA?

To what extent have the following factors impacted cargo e-bike implementation:

- Concerns about road collisions with other vehicles,bikes and/or pedestrians?
- Concerns about dangerous driving among other road users?
- Obstructions to cycling lanes?
- Concerns about potential theft of cargo e-bikes and/or packages?
- The cost of insurance and/or replacement costs in the event of theft or damage?

Informational *(access to data, knowledge transfer)*

Based on your understanding, are there any informational barriers that have impacted the implementation of cargo e-bikes among businesses within your BIA?

To what extent have the following factors impacted cargo e-bike implementation:

- Access to data measuring outcomes of deliveries by cargo e-bike (e.g., efficiency, costs)?
- Understanding the correct licenses, permit and insurance coverage for operating a cargo e-bike?

Operational *(trained riders, management, etc.)*

Based on your understanding, are there any operational barriers that have impacted the implementation of cargo e-bikes among businesses within your BIA?

To what extent have the following factors impacted cargo e-bike implementation:

- The distance of routes serviced by businesses within your BIA?
- Staff with cargo e-bike training or operational comfort using a cargo e-bike within businesses in your BIA?
- Management know-how to set up necessary infrastructure and/or procurement of cargo e-bikes?
- Access to or training for technicians to service cargo e-bikes?

Attitudinal *(reputation, perceptions, etc.)*

Based on your understanding, are there any attitudinal barriers that have impacted the implementation of bikes among businesses within your BIA?

To what extent have the following factors impacted cargo e-bike implementation:

- A general dislike or preference against cargo e-bikes?
- The desire to have more sustainable operations and/or establish a sustainable reputation?
- Concerns about a bad reputation for being unsustainable or for poor reliability if using cargo e-bikes?

Geography *(weather, topography, etc.)*

Based on your understanding, are there any geographical barriers that have impacted the implementation of cargo e-bikes among businesses within your BIA?

To what extent have the following factors impacted cargo e-bike implementation:

- Weather conditions (e.g., rain, snow, wind)?
- Topography (e.g., steep hills)?
- Temperature (e.g., cold, heat)?

Appendix C. Interview findings: Barriers and opportunities

C.1 Feedback by theme

Theme	Description
Financial	Barriers • High startup costs, as cargo e-bikes are about $8k apiece. 10 cargo e-bikes would cost $80k. • Cost of establishing a microhub and charging equipment. • Need to plan extra routes for cargo e-bikes, which can carry less per vehicle. Opportunities • The cost of cargo e-bikes can be significantly lower than the cost of new vans and trucks. • Cargo e-bikes can offer cost savings compared to vehicles due to reduced fuel costs. • Incentives such as bike subsidies or access to underused land (e.g., a parking lot) for use as a mobility hub could help support and scale the initiative.
Regulatory	Barriers • Lack of consistent standards across province (e.g., 3 wheels vs. 2 wheels) prevents scaling and adds administrative burdens. • Different rules around when bikes are required to be on sidewalks or roads make it hard to standardize training. • Jurisdictional confusion between different levels of government. • Businesses have different rules regarding loading or unloading zones, although this may not be a substantial barrier as almost all Calgary parking lots have bike parking. • Current confusion around liability, parking rules and bike laws. • Lack of consistency in regulations around cargo e-bikes leading to different regimes in the provinces and territories. • Lack of clarity around bike and fire safety certifications and regulations affect ability to procure insurance. • Land-use bylaws need to be updated to enable microhubs. • Need to clarify workplace compensation and liability issues if riders are hit by a vehicle.
Technological	Barriers • Battery longevity is a challenge in cold weather and with extra weight. • Servicing of cargo e-bikes is a challenge due to lack of trained mechanics.

	• Need a better understanding of the impact of weight on batteries, which could be addressed through pilots. • Cargo e-bikes are not well-equipped to carry perishable items that need refrigeration.
Infrastructure	Barriers • Snow clearance from roads and bike paths are an issue. In areas where the sidewalk is also being used as a bike lane, lack of compliance with snow clearing responsibilities is an issue. • Bike lanes are being built and the infrastructure is improving, but Calgary overall is still relatively car dependent and the lanes in some areas are sparse and spread out. While the network is relatively decent downtown, businesses may face difficulties using cargo e-bikes for delivery to the inner suburbs. • The bike lanes in Calgary are narrow by European standards and may not be sufficient for cargo e-bikes. • There are also challenges around finding a location for microhubs. They work well in areas of high density but in some locations (like downtown) the rent is too high and the area too crowded for them to work effectively. • Lack of bike parking in condos is a disincentive; one solution is parking shelters in neighbourhoods • Difficult to conduct operations in 9th Avenue as it is a large artery. Having more laneways or other alternatives would be conducive to operations. • Drop-off and pick-up loading zones, bike options in parking lots, or temporary patios would be useful. Need electrical wiring options to support parking structures as well for charging. • If bikes are coming from the north, the distances are longer and the infrastructure is more challenging. Cargo e-bike delivery might work better during peak hours and in the downtown core. • In the downtown areas without protected bike infrastructure, shared traffic lanes might be dangerous. Opportunities • Improved signage, delivery-friendly parking and a covered, heated hub with charging infrastructure would better support last-mile delivery services.
Safety and security	Barriers • Goods transported by cargo e-bike are more vulnerable to crime and theft. • Cargo e-bikes offer less protection for employees compared to vehicles. • Loss prevention mechanisms, proper insurance and designated loading areas must be implemented. • Training is needed for getting on, riding and parking the bike. • Shared traffic in downtown areas without protected bike infrastructure can be dangerous.
Informational	Barriers • Car dependency has created an information gap. • More detailed data on delivery time impacts is needed beyond a systems-level understanding.

	• Communication is lacking, and spreading information within the community should be a key priority. • Lack of information on the benefits of cycling, trip generation and the business case. Further understanding is also needed of bike capacity, restocking frequency, working hours and cost impact. Businesses need to see how cargo e-bikes can benefit their bottom line.
Operational	Barriers • Large order sizes and temperature sensitivity can cause quality issues. • Deliveries may be restricted to downtown, with packages limited to specific weights and shapes. • Finding cargo e-bike couriers may be difficult, as the job is physically demanding and exposes riders to traffic. • Hubs create additional touchpoints, which can be time-consuming. • The seasonal nature of cargo e-bike deliveries could create challenges for year-round employment and lead to high turnover. Opportunities • Cargo e-bikes can reduce travel time in dense, high-congestion areas. • A microhub or replenishment node closer to high-density areas makes sense, as Calgary's density is currently scattered.
Attitudinal	Barriers • Support may vary by area, with downtown and bike-friendly areas being more open than those farther out. • Active transportation is politically polarized at the provincial level. • Some businesses may prefer vehicles due to convenience and large shipment sizes. • Workers may be reluctant to ride in the cold, and unions would need to address licensing for bike couriers. • The concept of using cargo e-bikes needs to be promoted to delivery workers. Opportunities • Delivery work may attract younger or seasonal workers, such as students. • Given Calgary's relatively mild summers, delivery workers may prefer using e-bikes during this season.
Geographical	Barriers • Calgary winters present challenges for bike deliveries, including snow, ice, unplowed side roads and major weather events. • Tight delivery windows and distant warehouse locations could prevent businesses from adopting cargo e-bikes. • Current e-bike deliveries are concentrated downtown for efficiency, but high rental costs for a hub in the area could offset those savings. • Some business districts are situated away from primary streets, featuring free parking instead of street-facing shops designed for pedestrian access.

Other	Barriers • Uncertainty about how the city would establish and operate a delivery hub. Opportunities • Develop implementation guidelines, including a booklet on infrastructure, use areas, lanes widths and supported manufacturers. • Cargo e-bikes could serve nearby neighbourhoods, coordinated by the BIA and operated independently of individual businesses. A shared, central bike system could support local deliveries, reduce pressure on businesses and create jobs. • Pilot the program across seasons to evaluate effectiveness, refine the business case and provide tools for independent exploration of opportunities.

C.2 Feedback by stakeholder group

Logistics and delivery companies

Logistics and delivery companies identified several key concerns, such as inconsistent bike standards across provinces, which create administrative burdens, hinder scalability and complicate standardized training. Weather is another significant challenge, particularly Calgary's winters and their impact on battery performance and rider safety. Companies also highlighted the need for additional research into delivery timing and route planning, which adds financial costs. In addition, they pointed to potential inefficiencies in low-density areas, limited servicing options and the low carrying capacity of bikes. Improved bike infrastructure, including charging stations, parking and wider lanes, was seen as essential. Lastly, companies noted that encouraging rider adoption may be difficult, and licensing requirements could pose additional barriers.

Opportunities identified include the bike-friendly nature of the downtown Beltline area, the use of parking lots as microhubs, and flexible enforcement around ticketing. Additionally, companies highlighted the potential for establishing replenishment nodes in high density areas and using bikes during peak travel periods to save fuel. Stakeholders also expressed openness to receiving clear guidelines to support implementation.

Delivery clients

Common barriers among delivery clients include insufficient bike infrastructure, such as an underdeveloped bike lane system, lack of storage facilities, and limited charging options. Employee health and safety in harsh weather conditions and high-traffic areas also pose significant concerns, leading to increased liability and insurance requirements. Moreover, cargo e-bikes face constraints in terms of the weight and shape of products, as well as transporting

temperature-sensitive items. Challenges related to driver recruitment and the lack of scalability were also highlighted as well.

Delivery clients saw potential in the use of cargo e-bikes downtown and expressed openness to adoption, provided there is a strong business case.

Government agencies

Among stakeholders interviewed, government agencies commonly identified several barriers to cargo e-bike adoption, including road conditions during Calgary's winters, the cost of cargo e-bikes without federal incentives, inadequate maintenance infrastructure, and difficulties in making a strong business case. Additionally, inconsistent regulations across municipal and provincial governments, such as those related to approving signage for bike parking on roads, can complicate deployment. Concerns were also raised about rider safety and the size of cargo e-bikes, which may make them unsuitable for certain city lanes.

Commonly noted opportunities include supportive high-level policies, such as land-use bylaws that permit multiple land-uses, as well as the ongoing electrification of fleets and the development of charging stations. Efforts to improve bike parking and safety are also underway. Moreover, the city's existing infrastructure provides several advantages, including sidewalks with built-in ramps and the allowance of bike parking on sidewalks in most areas.

Business improvement areas

Business improvement areas identified several barriers, including inconsistent e-bike regulations across provinces, inadequate snow removal in winter, lack of clarity around securing parking for deliveries and storage, and high-risk conditions that necessitate proper workforce training. They also highlighted that Calgary is predominantly car-oriented, raising concerns about rider safety due to traffic and the risk of theft. Furthermore, BIAs noted that Calgary's expansive layout leaves its cycle network largely concentrated in downtown, where the narrow lanes are in need of upgrades. Lastly, businesses lack information on the benefits of switching to cargo e-bikes and how it could affect their bottom line.

Commonly mentioned opportunities were the suitability of cargo e-bikes for downtown, existing bike parking in parking lots across the city, the potential for locally focused cargo e-bike deliveries coordinated by BIAs and the addition of parking shelters in neighbourhoods. Additionally, business improvement areas pointed to the use of incentives and pilot programs to encourage e-bike adoption among businesses.

Photo: Robert Hornyak, Pembina Institute

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