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Photo: Courtesy of The Drop

Modernizing urban freight deliveries with **cargo cycles**

Last-mile deliveries are being disrupted by e-commerce expansion, customer demands for faster delivery, population growth, rising urban land costs, and increasing congestion. Companies are acting quickly to develop new business models for transporting goods between producers, distribution centres, and consumers to respond to these trends.

Innovative solutions for goods movement in urban centres

Cyclelogistics is the integration of bicycles, tricycles, and other cycling technology into the goods movement network to improve the efficiency of deliveries in congested urban areas.[1] It may include a rider wearing a backpack, a cycle with panniers, or a cycle equipped with a cargo unit (referred to as a cargo cycle). Because cyclelogistics is a zero-carbon delivery approach and cycles take up less space than conventional vehicles, it has the potential to address many of the challenges associated with last-mile deliveries in urban centres, including congestion, emissions, and limited curbside space. Cyclelogistics is also beneficial to businesses by reducing fuel costs and parking fees, and offering branding opportunities.

Cyclelogistics is not a modern concept — before cars dominated the transportation landscape, bicycles were used as goods-movement vehicles.[6] Today, delivery by cycle is picking up again and has been re-established

Key trends in freight

- Goods movement is a backbone of Ontario's economy: 38% of the province's economy comes from freight-intensive industries, and trade between Ontario and the United States was worth $284 billion in 2011.[2]
- The transportation sector is the largest source of emissions in Ontario, and the freight sector currently accounts for 10% of the province's greenhouse gas (GHG) emissions. Emissions from freight are projected to surpass passenger emissions by 2030 in Canada.[3]
- Canadians will continue to shop online in greater numbers, with sales in Canada to reach $55.78 billion by 2020. As a comparison, in 2016 brick-and-mortar sales grew by 2%, while at the same time online retail sales grew by 15%.[4]
- The volume of road freight activity in Ontario grew by 242% from 1990 to 2014.[5] Greater road freight volumes present impacts to public health, air quality and road safety.

by many cities, including in the U.S. and Europe. In North America, small- and medium-sized businesses such as local restaurants and artisanal food companies are making deliveries with cargo cycles (e.g. The Drop, SendIt Courier, B-Line). Large courier companies are also getting on board — UPS, for example, is piloting cargo cycles in Portland, Seattle, and Toronto.[7]

The challenges

Although cargo cycles have the potential to benefit businesses, cities, and consumers, they also pose challenges. Companies need to consider the labour, safety and legal aspects of cargo cycle operations. This is made more challenging by the often-unclear regulatory status of cargo cycles.

Manufacturers in Asia, Europe, and North America have produced cargo cycles with varying dimensions, size, speed, propulsion methods, and cargo-carrying capacities. Given the diversity of cargo cycle technologies and designs, it is difficult for policy makers to develop consistent regulations across jurisdictions while also addressing the diverse capabilities of different cycle types.

Experiences show that in most commercial situations, cargo cycles need to be equipped with electric assist (i.e. e-bikes) to be viable and efficient; electric assist is essential when carrying large loads or navigating up hills. Like cargo cycles, a variety of e-bike technologies exist (see Figure 1). In Canada, the regulatory framework for these technologies is inconsistent. Provinces and municipalities follow the federal Motor Vehicle Safety Regulations' (MVSR) definition of a power-assisted bicycle when regulating e-bikes; however, some jurisdictions adopt different terminology or stricter specifications (see Table 1). In general, provinces and municipalities consider e-bikes to be conventional bicycles, subject to the same rules as normal bikes (with a few exceptions). For example, e-bikes are generally permitted to use bikes lanes and recreational paths.

Some jurisdictions in the United States have addressed the regulatory challenges surrounding e-bikes by applying different rules to different classifications of e-bike technologies (see Table 1). PeopleForBikes, an industry coalition and charitable foundation based in Colorado and Washington D.C., has developed model legislation that categorizes e-bikes into three classes

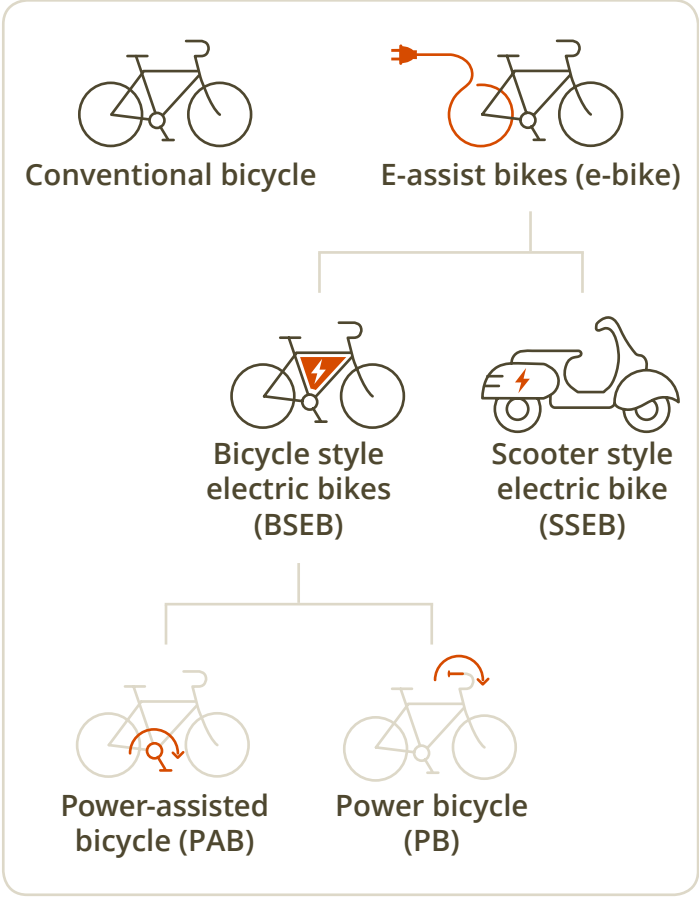

Figure 1. E-bikes are usually differentiated by their geometry, speed, safety features, motor type, and propulsion method, and whether they are equipped with functional pedals. These e-bike designs also have the potental to carry cargo and may be equipped with panniers or front/back cargo units to do so (Icons adapted from National Institute for Transportation and Communities).[8]

Table 1: E-bike classifications provided by PeopleForBikes[9]

Class 1	"electric bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches the speed of 20 miles per hour [32 km/h]"
Class 2	"electric bicycle equipped with a motor that may be used exclusively to propel the bicycle, and that is not capable of providing assistance when the bicycle reaches the speed of 20 miles per hour [32 km/h]"
Class 3	"electric bicycle equipped with a motor that provides assistance only when the rider is pedaling, and that ceases to provide assistance when the bicycle reaches the speed of 28 miles per hour [45 km/h]"

based on their speed and whether they are a power-assisted or powered bicycle.[10] They suggest that only Class 1 and 2 e-bikes, which have a maximum speed of 32 km/h, be permitted on bicycle or multi-use paths. As of 2018, a number of states have adopted PeopleForBikes' model legislation, including California, Washington, Colorado, Tennessee, Illinois, and Connecticut.[11]

A similar classification approach could be applied to regulate different types of cargo cycles in Canada. Currently, no provincial or federal regulations or municipal bylaws address cargo cycles, whether they are pedal-only or electric-assist. No guidance is given on the permitted size of a cargo bike, the volume and weight that it can carry, or the type of cargo being transported. This does not give businesses the certainty and clarity they need to adopt and increase uptake of cargo bike deliveries in Canada's urban centres.

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Table 2: E-bike regulations in Canada

Jurisdiction	Legislation	Terminology	Max Weight	Other Specifications
Canada	Motor Vehicle Safety Regulations – C.R.C., c. 1038 (Section 2)	Power-assisted bicycle	--	Electric motor can be engaged with or without muscular power (if the latter, power assistance ceases when brakes are applied)
Ontario	Highway Traffic Act, R.S.O. 1990, c.H.8 Reg. 369/09	Power-assisted bicycle	120 kg	Is capable at all times of being propelled on level ground solely by using muscular power to operate the pedals
Toronto	City of Toronto Municipal Code	Power-assisted bicycle or pedelec	40 kg	Requires pedalling for propulsion ("pedelec"), or other similar vehicle but does not include any vehicle or bicycle capable of being propelled or driven solely by any power other than muscular power
Alberta	Use of Highway and Rules of the Road Regulation Traffic Safety Act	Power bicycle	--	Electric motor can be engaged with or without muscular power (if the latter, power assistance ceases when brakes are applied)
Calgary	N/A	Pedelec	--	Only pedelecs with a pedal assist motor are permitted. Power on demand e-bikes that use a throttle to activate the motor are not considered bikes and therefore are not permitted on pathways or trails.
Quebec	Highway Safety Code (CWLR, c. C-24.2)	Power-assisted bicycle	--	Electric motor can be engaged with or without muscular power (if the latter, power assistance ceases when brakes are applied)
Montreal	N/A	Power-assisted bicycle	--	Electric motor can be engaged with or without muscular power (if the latter, power assistance ceases when brakes are applied)

Each province and municipality follows federal regulations on maximum speed (32 km/hr) and maximum power (500 W).
-- indicates that there is no specification.

Addressing the challenges

Further work is needed to determine the regulatory approach that is most effective to ensure the safety of all road and sidewalk users while taking advantage of the opportunities that cargo cycles offer. Developing regulations that are specific to existing cycle technologies while anticipating future innovations will also be a challenge. Regardless of whether cargo cycles are best managed with strict or open-ended regulations, a number of elements must be considered:

Cargo cycle specifications

- Speed and weight restrictions (with/without rider, loaded/unloaded weight, with/without e-assist)
- Propulsion methods (e.g. pedal-only, power-assisted, throttle-only capabilities)
- Dimensions and number of wheels
- Cargo unit dimensions and capacity
- Safety requirements (e.g. age restrictions, helmet use, passenger allowance)
- Allowed uses (e.g. passenger versus commercial uses)
- Cargo types (e.g. people, food, medical supplies)
- Licensing and insurance requirements

Use of public roadways and infrastructure needs

- Infrastructure permissions and right of way (e.g. road use, bike path use, parking, loading zones)
- Location and use of charging infrastructure (for e-cargo cycles)
- Storage

In Europe, the EU provides vehicle classifications that include two- and three-wheeled vehicles and quadricycles[12]. The classifications provide clarity on the maximum speed, maximum power, and propulsion methods for each vehicle type. Powered cycles, for example, are equipped with functional pedals and an auxiliary propulsion method such as an electric motor to assist with pedalling. Powered cycles have a maximum speed of 25 km/h and a maximum power of 1000 W.

Although European-wide vehicle classifications exist, further regulations for e-bikes and cargo cycles vary between countries. Regulations in Austria permit the use of cargo cycles that are less than 80 centimetres wide on cycle lanes and paths[13]. Cargo cycles that exceed this width must use the road. Regulations also clarify the weight allowance of cargo cycles — multi-tracked cargo cycles must not exceed a payload capacity of 250 kg. In the U.K., a weight restriction on e-bikes was removed in 2015[14]. Presumably this would allow cargo cycles with e-assist to carry heavier loads.

Photo: Roberta Franchuk, Pembina Institute

Public e-bike charging station in Europe.

Although European countries are often praised for better cycling infrastructure, they are also facing similar policy and regulatory challenges. In many countries, there is still uncertainty about how cargo cycles should be integrated with other road users, where they are permitted to load and unload, and the parking facilities needed to accommodate cargo cycles[15].

As Canadian jurisdictions continue to explore answers to these issues, they can lean on existing policy frameworks that nurture the environment for cargo cycles. In Toronto, for example, policy 8.28 of the City of Toronto's Downtown Plan encourages the use of smaller vehicles and non-motorized transportation modes for deliveries and goods movement in the city[16]. The City's Complete Streets Guidelines also acknowledge that cargo cycles must be considered in the street design process[17]. As more businesses incorporate cargo cycles into their operations, it will be important for governments to follow through on such policies.

Endnotes

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