

CYCLING, ENERGIZED!

A REPORT ON THE STATE OF E-BIKES IN CANADA



March 1, 2023



PREPARED BY

STUCKLESS
CONSULTING INC.



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Dear Reader,

I have been working in the active transportation and micromobility sector for the past 15 years, and during that time, I have developed a real love and appreciation for e-bikes! I believe that e-bikes have a huge potential to grow cycling and make it more accessible for more people. The current research backs up this belief, as does my own personal experience with e-bikes, and the experiences of the people whose stories are highlighted throughout this report.



I wanted to produce this report on e-bikes because I don't think we are doing enough in Canada to leverage their true potential. Despite their growing popularity, there is a lot of uncertainty about e-bikes that is holding us back. Uncertainty about what they are and where they should be allowed to ride, uncertainty about whether they are safe and uncertainty about how people are using them. I've been involved in policy making and advocacy for long enough to know that one report won't change the situation overnight, but I hope that it can be a helpful resource for policy makers, organizations and advocates looking to learn more about how e-bikes fit into their work.

In this report, I have compiled relevant and current research about e-bikes, stories from people who use e-bikes, a summary of the various e-bike definitions and regulations from around the world, and strategies for increasing access to e-bikes. I have also tried to answer some of the questions that I receive regularly about e-bikes and address common e-bike misconceptions.

Before you get started reading the report, I'd like to share a few notes. First, this report is written from my perspective as an Ontario-based consultant, but I believe that it contains information that is relevant across Canada. Second, this is not an e-bike buyers guide. There are people and bike shops that are much better suited to providing e-bike specs and purchasing advice than I am, my focus here is on how e-bikes are being used and regulated. Third, if you are looking for a deeper dive on e-cycle logistics and cargo bike delivery options, I suggest looking at the Pembina Institute's body of work on that topic. And lastly, let's talk terminology. Throughout this report I refer to non-electric bicycles as "conventional bikes". I've seen people call them traditional bikes, acoustic bikes, and pedal bikes, but to align with the terminology most prominent in the literature, I went with "conventional".

My goal at Stuckless Consulting Inc. is to support governments and organizations in their efforts to co-create sustainable, inclusive, and healthy communities. I strongly believe that supporting the growth of e-bikes is part of this work. The purpose of this report is to provide information, not specific advice, and I hope you will reach out to discuss your e-bike challenges and opportunities in more detail.

Thanks for your interest in this report!

A handwritten signature in black ink, appearing to read 'Jamie Stuckless', with a stylized flourish at the end.

Jamie Stuckless
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1.0 WHY PLAN FOR E-BIKES

E-bikes should be part of the conversation for any community looking to increase cycling, reduce the costs of transportation, support more equitable transportation networks, and lower greenhouse gas emissions. E-bikes can play an important role in helping communities meet strategic transportation and climate change objectives, but only if we plan for them, and so far, that isn't happening. Research suggests that less than 1/3 of transportation plans and policies include e-bikes,ⁱ and this needs to change.

Why should policy makers plan for e-bikes?



E-Bikes increase feelings of safety.

E-bike riders report that they feel safer on their e-bikes than on conventional bikes. This is because e-bikes allows them to take longer routes to avoid dangerous areas and helps them to keep up with the flow of traffic.ⁱⁱ Multiple studies found that people have increased feelings of confidence cycling in traffic on an e-bike.ⁱⁱⁱ



E-bikes are great exercise.

Although cycling with reduced effort is seen as a primary benefit of e-cycling, it's still a great form of exercise because people who ride e-bikes tend to increase their cycling frequency and duration. Research shows that riding an e-bike has similar physical activity benefits to riding a conventional bike.^{ix}



E-Bikes replace car trips.

Research amongst North American e-bike users shows that people are more likely to replace a car trip with an e-bike than with a conventional bike.^{iv} Multiple studies have shown e-bikes substituting for 20% to 86% of car journeys^v, including in rural areas.^{vi} This substitution can help to meet goals around reducing traffic congestion and reducing transportation-related greenhouse gas emissions. Research estimates a 225-460 kg CO2 net emissions reduction per person per year through e-bike adoption.^{vii}



E-Bikes increase access.

E-bikes can increase cycling participation for groups typically underrepresented in cycling such as women, families, people with disabilities, and seniors. This is linked to the many benefits of e-cycling, including being able to ride with less effort, being able to ride longer distances and keep up with friends and family, being able to ride hilly terrain and carry heavier loads and being able to continue to cycle despite physical limitations.^x



E-Bikes increase cycling.

Research consistently demonstrates that people on e-bikes increase their cycling frequency, and in some cases almost double the number of km they cycle on a regular basis.^{viii}



The e-bike market is growing.

If for no other reason, it is important to plan for e-bikes because they are a growing presence on our streets and in our communities. The use of electric bicycles has been growing, with e-bike sales outpacing the sale of electric vehicles in the United States^{xi} and e-bike ridership almost doubling, or more, every year since 2015.^{xii} Strava's 2022 global dataset shows a 26% increase in the share of cyclists with an e-bike^{xiii} and e-bikes are being ridden 36% more than conventional bikes by bike share users.^{xiv}

2.0 DEFINING E-BIKES GLOBALLY

An important starting point for any conversation about e-bikes is “what is an e-bike”. The definition of e-bikes is evolving, and the specifics depend on where you are located.



1. Australia has two types of e-bikes, power-assisted pedal cycles and electrically power-assisted cycles. Both must be designed to be propelled primarily by the rider. Power-assisted pedal cycles cannot be exclusively propelled by the motor, can have a maximum motor output of 200 watts and must weigh less than 50kg. Electrically power-assisted cycles can have a power output up to 250 watts and a motor that cuts off when the bicycle reaches 25km/h or the rider stops pedalling and travel speed exceeds 6km/h.

2. China implemented a new national standard for electric bicycles in 2019. This standard requires electric bicycles to have pedals that function and speeds that do not surpass 25km/h. The weight of e-bikes cannot exceed 55kg and the maximum motor output is 400 watts. E-bikes must also include tamper-proof, fire-proof and charger protection systems. Vehicles that do not meet these requirements are classified as electric motorcycles and require a driver's license and license plates.

3. European Union e-bikes with a maximum speed of 25km/h and a maximum power of 250 watts are known as “pedelecs”. They only receive motor assistance when the rider is pedaling and are legally classified as bicycles. While pedelecs are permitted to operate in the

same way as conventional bikes, all other e-bikes are subject to additional considerations, known as “type approval”. This includes a type of faster e-bike called S-pedelecs, which can travel at speeds of up to 45 km/h.

4. In India, electric bicycles have a power output of less than 250 watts and a top speed of no more than 25 km/h. E-bike riders are not required to have insurance, register e-bikes, or have a driver's license.

5. Israel instituted new e-bike rules as of 2019, requiring e-bike riders to be over 16 years of age and have a new category of driver's license for electric bicycle riders. Every person riding a bicycle must also wear a helmet and a reflective vest after dark. The speed limit for e-bikes is 25 km/h.

6. Japan's e-bike laws include bicycles that receive motor assistance up to 24 km /h, and anything beyond that is considered a motorbike and requires a license.

7. The Philippines outlines several different categories for electric vehicles, and e-bikes fall under category L1a. E-bikes can be propelled up to a maximum speed of 25km/h and may be operated in bicycle lanes. Riders are required to wear a protective helmet. A driver's license and registration are not required.

8. Singapore's power-assisted bicycles must not exceed 20kg in unladen weight and must have a motor with a maximum power output of 200 watts. The maximum speed is 25km/h.

9. South Africa is moving forward with a bill in which a bicycle with a total weight not exceeding 30kg and an electric motor not capable of propelling the bicycle unassisted at a speed not exceeding 25km/h would be considered the same as a conventional bicycle.

10. In South Korea, a new law passed in 2018 categorizes pedal-assist bicycles as regular bicycles. They are permitted on cycling infrastructure across the country if they meet special requirements, including a maximum speed of 25 km/h and a maximum weight of 30

kg. Prior to this new law, e-bike riders required a driving license and were not permitted on bicycling infrastructure. Throttle-activated electric bikes, imported e-bikes without safety confirmation and bicycles modified with a motor kit are still prohibited from bike paths, as are moped style e-bikes.

11. In the United States, work is underway to standardize e-bike definitions with the use of a 3-Class system. To date, this approach has been adopted in almost 40 states. Under this system, all e-bikes must have operable pedals, a saddle or seat and an electric motor of less than 750 watts. No license or insurance is required to use them. Class 1 and Class 2 e-bikes can have a maximum speed of 32 km/h, have no minimum age requirement, and do not require helmets for riders over the age of 18. The difference is that Class 2 e-bikes only provide assistance when the rider is pedaling, while Class 2 e-bikes (or throttle e-bikes) can be propelled independently by the motor without pedaling. Class 3 e-bikes can provide assistance of up to 45 km/h, have a minimum age of 16 years and mandatory helmets for all riders.



FAMILIES ON E-BIKES

Robin Richardson, [Happy Fiets Canada](#)

I used to carry my kids in a big SUV. Driving felt wasteful and frustrating, but necessary. Then we invested in two e-cargo bikes, and our lives improved in every way - we saved money, time, and stress while having healthy, active fun as a family. Our kids were more focused at school; we started our workdays alert and relaxed; and we felt better-connected to our community. The benefits were so profound that I started a small rental company called Happy Fiets so that more people could experience the freedom that e-cargo bikes offer.



3.0 DEFINING E-BIKES IN CANADA

Up until recently, e-bikes in Canada have been defined federally as power-assisted bicycles in the [Motor Vehicle Safety Regulations](#). This definition required e-bikes to be equipped with pedals, travel on no more than three wheels, have a maximum power output of 500 watts, a maximum speed of 32km/h and be capable of being propelled by muscular power. Many provinces and territories used this federal definition in their own traffic acts and applied additional requirements around age, weight of the bike, helmet use and where they could travel. The federal definition was criticized for being broad enough to include both bicycles with an electric assist (e-bikes) and low speed motorcycles with pedals attached (often called mopeds).

In February 2020, amidst advocacy for the federal definition to better distinguish between e-bikes and mopeds, Transport Canada announced their intentions to repeal their definition of power-assisted bicycles and download this responsibility to the provinces and territories. This change became effective in February 2021. In the now absence of a federal definition, the previous federal definition continues to apply until provinces and territories develop their own to replace it.

3.1 PROVINCIAL & TERRITORIAL DEFINITIONS

At present (March 2023), few provinces and territories have updated their e-bike definitions to reflect federal changes. An early exception to this has been Ontario, which put forward new definitions in 2021, however, these **new definitions are not yet in effect**. In 2021, the Moving Ontarians More Safely (MOMS) Act included new definitions for e-bikes, which distinguish between three different types of e-bikes. It is important to note that the definitions received royal assent but have not yet been proclaimed. The associated e-bike regulations have also not yet been released and the former e-bike definitions remain in effect. See Table 1 for a summary of the current and pending e-bike definitions in Ontario.

How e-bikes are defined and categorized is important, because it can determine where people on different types of e-bikes are allowed to ride. As will be discussed in more detail later in this report, some jurisdictions restrict e-bike access on bicycle infrastructure and multi-use paths. Provinces and territories can make regulations about where e-bikes can ride, and municipalities can pass local by-laws about it.



Table 1. E-Bike Definitions in Ontario

Description	Status	Terminology	Min. Age	Min. Age (Passenger)	Helmets Required	Max. Speed	Max. Weight	Max. Power	Additional Notes
Current definitions	In effect	Power-assisted bicycle	16 yrs.	16 yrs.	Yes	32 km/h	120 kg	500 watts	
Definitions in the MOMS Act 2021	Received Royal Assent, but not yet proclaimed	Bicycle-style e-bike (type 1)	14 yrs.	None if seat available	Any changes to helmet requirements determined in regulations	32 km/h	55 kg	500 watts	Ministry of Transportation continues to analyze future e-bike redefinitions.
		Motor scooter-style e-bike (type 2)	16 yrs.				120 kg		
		Motorcycle-style e-bike (type 3)							
Cargo e-Bike Pilot	In effect March 1, 2021 to March 1, 2026	Cargo e-bikes	16 yrs.	None if seat available	Yes	32 km/h	no limit (55 kg +)	1000 watts	Must have traditional bicycle design and a platform, basket, or container; max. width 1.3m, max. length 4m and max. height 2.2m; only partial enclosure of occupants permitted. Municipalities must opt-in to pilot to participate

*all categories outlined above must have working pedals that are capable of propelling the bicycle

**all categories outlined above must have two or three wheels with a minimum diameter of 350mm and minimum width of 35mm

***no license is required for the above categories

You'll note in Table 1 that the definitions passed as part of the MOMS Act distinguish between three different types of vehicles, but that the types are not aligned with the 3 Class system being implemented in the United States. The MOMS Act definitions group class 1 (pedal-assist) and class 2 (with a throttle) e-bikes together as "bicycle-style e-bikes" and exclude class 3 e-bikes that can travel up to 45 km/h.

Another important difference with the MOMS Act definitions is the introduction of a 55 kg weight limit. While weight limits for e-bikes vary around the world, this new weight limit in Ontario excludes several adaptive e-bikes and popular models of family-style cargo e-bikes that weigh 60 kg. These slightly heavier bikes fall into the e-cargo bike pilot, which only applies if municipalities proactively opt-in.

Outside of Ontario, Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland and Labrador, Nova Scotia, Prince Edward Island, Québec, Saskatchewan, and Yukon have also accounted for e-bikes in their respective highway or traffic acts. The specifications they have included are outlined in Table 2. To the best of my knowledge, Northwest Territories and Nunavut have not made additional specifications about e-bikes in their respective acts.

Table 2. E-bike definitions across Canada

Province / Territory	Terminology	Min. Age	Min. Age (Passenger)	Helmets Required	Max. Speed	Max. Weight	Max. Power	Additional Notes		
Alberta	Power-assisted bicycle	12 yrs.		Yes	32 km/h	None	500 watts	Mopeds are a separate licensed category.		
British Columbia	Motor assisted cycle	16 yrs.		Yes	32 km/h		500 watts	Max three wheels, motor must disengage when rider quits pedalling; limited speed motorcycles are a separate licensed category.		
British Columbia (Provincial Parks)	Class 1 E-Bike (Pedal assist)	16 yrs.		Yes	32 km/h		500 watts	Allowed where cycling is already permitted, unless signs indicate that trail is closed to e-bikes		
	Class 2 E-Bike (Throttle actuated)							Usually allowed where motorized vehicles are permitted, such as roadways and off-road vehicle areas		
	Class 3 E-Bike				45 km/h					800 watts
	Adaptive mountain bikes									
Manitoba	Power-assisted bicycle	14 yrs.		Yes	32 km/h		500 watts	Max three wheels; motor must stop providing power when driver stops applying muscle power. May not be driven on sidewalks.		
New Brunswick	Motor Driven Cycle			Yes	32 km/h		500 watts	Max three wheels. If the vehicle is able to be powered by human force and has a motor equal to or less than 500W, and the motor is not capable of assisting when the vehicle is travelling at a speed greater than 32km/h then it can be considered a bicycle and all the requirements placed on bicyclists are applicable.		
Newfoundland and Labrador	Power-assisted bicycle							Cannot be operated on a highway with a speed limit of greater than 80 km/h.		

Nova Scotia* ^{xv}	Bicycle			Yes	30 km/h		500 watts	E-bikes meeting these specifications captured within Motor Vehicle Act definition of a bicycle; Additional specifications include having operable pedals and either two tandem wheels either of which is 350mm or more in diameter or that has four wheels any two of which are 350mm or more in diameter, but does not include a wheelchair
Prince Edward Island	Power-assisted cycle	16 yrs.	None if seat available	Yes	32 km/h	120 kg	500 watts	Additional specifications provided about where they are prohibited, including the Confederation Trail (except between April 1 and Nov 30th of the same year)
Saskatchewan	Power-assisted bicycle	14 yrs.		Yes	32 km/h		500 watts	Considered a recreational vehicle, registration is not required.
Québec	Power-assisted bicycle	18 yrs.		Yes	32 km/h		500 watts	People aged 14 to 17 who hold a Class 6D (moped or motorized scooter) license are also authorized to ride an electric bike; electric mopeds are a separate licensed category
Yukon	Electric power-assisted cycle	see note			32 km/h		500 watts	Max three wheels; motor must stop providing power when driver stops applying muscle power. Municipalities may make bylaws about sidewalk riding, licensing. Note: The Commissioner in Executive Council may make regulations establishing the age below which a person is prohibited from operating an electric power assisted cycle on a highway.

* In Nova Scotia, the Motor Vehicle Act from which the definition has been pulled is in the process of being updated.

**Efforts were made to verify the above information with officials in each province. Where that was not possible, the information was verified by another researcher. If you notice any gaps or errors, please feel free to reach out.

3.2 CONSIDERATIONS FOR DEFINING E-BIKES

Perhaps the reason we see such variation across e-bike definitions is because e-bikes come in a wide variety of shapes and sizes to serve a broad and diverse audience of people. It is ultimately positive that e-bikes can meet so many different needs, and when we are defining and regulating e-bikes, it is important not to exclude types of e-bikes that provide crucial mobility options.

The following considerations have been pulled from the e-bike stories people shared for this report, research, and my own experience:

Maximum Speed

- North America is an outlier when it comes to having a maximum speed of 32km/h for e-bikes (compared to 25km/h), however, surveys of North American e-bike users have highlighted the ability to keep up with the flow of motor vehicle traffic while cycling on-road as a perceived safety benefit of riding an e-bike.

Throttle e-bikes (e.g., Class 2)

- Throttle e-bikes are typically available at a lower price point than pedal-assist e-bikes (\$2,000 - \$3,000 compared to \$5,000 - \$8,000). Restricting their access on trails and other infrastructure can limit the mobility of a lot of people seeking a more affordable option.
- Access to a throttle can provide much needed assistance for people who cannot pedal the entire time, or in every situation.

Weight & Bike Design

- Creating distinctions based on weight or e-bike design can inadvertently exclude many popular and useful styles of e-bike, including family-style cargo e-bikes, adaptive trikes and the trishaws used in programs like [Cycling Without Age](#) (see image below for examples).

Evaluation

- More research and evaluation should be undertaken here in Canada to understand the impacts of new and changing e-bike regulations and address knowledge gaps. This includes looking at how e-bikes interact with other people walking and cycling on trails and pathways.



4.0 COMMON MISCONCEPTIONS

There are several common misconceptions about e-bikes. They can serve as major barriers to increasing e-bike access, so they are important to address.

E-Bikes are cheating.

The social stigma associated with riding an electric bicycle was a common barrier to e-biking in an international scoping review of e-bike literature.^{xvi} People highlighted concerns about being judged by others for choosing to ride an e-bike and that they were perceived lazy for doing so. There is a persistent view that riding an e-bike is “cheating”, but cheating at what? Getting to the grocery store? Dropping your kid off at school? Having a fun time on a bike? Sure, if someone tried to bring an e-bike to the Tour de France or an organized bike race, it would likely be considered cheating, but most of us are not in the Tour de France.

When it comes to e-bikes, they are helping make cycling more accessible and helping more people cycle further, more often, and for longer in life. There is nothing that says that cycling must be physically strenuous for it to be worthy of investment. E-bikes can make cycling

easier for so many people, and that's something that transportation planners should be excited about!

People on e-bikes can turn their motors off where e-bikes are prohibited.

It has been suggested that people on e-bikes can simply turn their motors off when riding on trails or infrastructure where they are prohibited. This is not a solution, especially for people who are riding because of the electric assist. Reduced overall effort is one of the most common perceived benefits of e-bikes^{xvii} and turning off the motor removes this benefit. A common barrier to e-biking is a concern about the added weight of e-bike and having to ride a heavier bike without e-assistance if the battery dies.^{xviii} Having e-bike riders turn off their motor means that they are now riding a heavier bike without the desired assistance, defeating the reason why many are e-cycling in the first place.



COMMUTING BY E-BIKE

Honourable Bowinn Ma, Minister of Emergency Management and Climate Readiness (BC)

Given the climate emergency, my partner and I wanted to go down to having one vehicle. We went from having two gas powered vehicles, to having one electric vehicle and one e-bike, and generally it has been very positive.

You can read Minister Ma's full e-bike story at ebikes-international.com.



People on e-bikes aren't getting any exercise.

The criticism about e-bikes as cheating is often linked to the myth that riding an e-bike isn't really exercise. Even if this was true, it shouldn't matter because there are lots of great reasons to ride a bike other than exercise. But it's not actually true. E-bikes are a great form of exercise! Research has found that riding an e-bike results in similar physical activity gains as riding a conventional bicycle^{xxix} and that people who ride e-bikes tend to increase their rate of cycling.^{xx}

E-bikes are too fast to share space with people cycling and walking.

The speed at which e-bikes can travel is often a top concern, particularly when it comes to e-bikes sharing space with people cycling and walking along shared trails and on busy cycling infrastructure. A common reaction to these concerns has been to prohibit people on e-bikes from cycling on trails and some cycling infrastructure, however, it is important to note that just because people can go top speed on an e-bike doesn't mean that they will. Additionally, conventional bicycle riders can

also reach high speeds, so prohibiting e-bikes does not eliminate speed concerns.

According to current research, e-bikes don't travel that much faster than conventional bikes. In the United States and Europe, research has shown that most e-bikes travel at an average of 1 to 4 km faster than conventional bikes.^{xxi} As a note, this doesn't apply to Class 3 e-bikes and S-pedelecs that can go up to 45km/h. They have been found to travel from 9 km/h faster to double the speed of conventional bikes^{xxii} and typically are not permitted on shared trails.

A study of shared-use spaces between pedestrians, conventional cyclists and e-bike riders in Shenzhen city, China found that while conflicts between pedestrians and e-bike riders were more common, traffic complexity and high traffic volume were the main contributing factors.^{xxiii} Path design, conditions and user volume influence the speed at which people on bikes travel^{xxiv} and if we want to manage speed, infrastructure design is the main determinant of speed for people on e-bikes.^{xxv}



E-BIKING FOR HEALTH

Mark Anderson

Three months ago, my family decided to buy me an e-bike. Since then, I have noticed that simple routine rides like riding to the pharmacy (3km) have been turning into longer rides because the hills and headwinds no longer tire me out. As an older adult with a mild disability and living in a city with many hills (there is always one more hill), I have found that the e-bike has opened the city to me for appointments, social gatherings and even for advocacy. I can see how having the e-bike will help in the years to come as a mobility device for me and continue keeping me car-free.



5.0 E-BIKE SAFETY

Research has produced mixed findings regarding the safety and injury risk related to e-bikes compared to conventional bikes. A safety review conducted by People for Bikes in 2019 concluded that there was no definite answer on whether e-bikes are more, or less safe than conventional bikes. That review highlighted research from The Netherlands that reported an overall higher crash risk and likelihood of injury upon dismounting from e-bikes, however, not once the study controlled for kilometers traveled and age. Older adults tend to have slightly higher injury rates that are mostly linked to incidents during mounting and dismounting because e-bikes are heavier than conventional bikes. E-bikes have been assessed to be less stable than conventional bikes during mounting and dismounting, but more stable during cycling.^{xxvi}

A more recent scoping review of e-bike policies and practices found similarly mixed results.^{xxvii} While three studies found a similar risk and severity of injury between e-bikes and conventional bikes, one study found a higher risk of crashes that required an emergency department visit for e-bike users. Increased risk factors related to e-bikes include a lack of familiarity with how e-bikes function, increased exposure due to increased usage, higher age and speed and lower fitness levels of riders. One study noted that the main causes of incidents were user related and road design related, while another study observed that most incidents occurred because of slippery surfaces.

E-bike safety is an area that requires more research, particularly in the North American setting as e-bikes grow in popularity and new e-bike rules are adopted. Many of the studies are undertaken in countries where the speed limit for e-bikes is 25 km/h, which differs from our current speed limits of 32 km/h, and where throttle e-bikes can be less common.



E-BIKES FOR ALL AGES

Jim and Mary Boate

My wife Mary and I have both been recreational and utilitarian cyclists for many years. As we grew older and the riding got a little harder, we decided to make the switch to e-bikes. We do a lot of cycling tourism with our e-bikes, as well as local cycling with friends. Over half of the members of our 55+ bike club have now switched to e-bikes! We don't go any faster, we just go easier. E-bikes have allowed many members to keep up with the social side of getting older, and I am inundated with friends asking questions about switching to e-bikes.



6.0 MUNICIPAL ROLE

In Ontario, and across Canada, municipalities play a key role in planning for e-bikes. Despite the growth and popularity of e-bikes, there remain many barriers that limit the potential of e-bikes that can be addressed at the municipal level. This includes fear of theft and lack of secure parking, safety concerns about riding in traffic with motor vehicles and a lack of safe cycling infrastructure. Range anxiety and the need for charging stations, the cost of e-bikes, and confusion over regulations and where e-bikes can ride can also be addressed.^{xxviii}

When it comes to supporting e-bikes, the municipal role includes:



Further regulating e-bikes

Although e-bikes are defined at the provincial level, municipalities can further regulate e-bikes. This includes adding further distinction between e-bike types and passing bylaws about whether e-bikes can ride on municipal roads, sidewalks, bike paths, bike trails, and bike lanes. To date, most municipalities have not taken this step, with only 14% of jurisdictions reporting that they further regulate e-bikes.^{xxix} Table 3 includes some of the ways that municipalities have added further distinctions and regulations for e-bikes. You can also reference the considerations for defining e-bikes in section 3.2.



Promoting e-bikes

Municipal campaigns to support and promote cycling, such as Bike Month, can specifically include e-bikes and help promote them as a “normal” mode of cycling. This is important to help address the stigma many riders identified against riding an e-bike because it was perceived as cheating, or lazy.^{xxx} In addition to this, having clear communications about where e-bikes are welcomed can help to address confusion about how e-bikes are regulated and make it clear to residents and tourists alike where they are welcome to e-cycle.



Building safe cycling infrastructure

E-bikes have been found to help increase rider confidence and feelings of safety, but overall, a lack of safe cycling infrastructure has been identified as a common barrier to e-cycling. Municipalities play a crucial role in planning for and building much needed cycling infrastructure. As discussed in the misconceptions section, infrastructure design also plays a key role in managing speed. Although e-bike riders don't necessarily travel that much faster than people on conventional bicycles it is a concern and municipalities can design shared pathways and bicycle facilities to accommodate volume and with speed management in mind.



Providing secure bike parking

Due to the often-higher value of e-bikes, many e-bike owners and potential owners are concerned about theft. The provision of secure public bike parking facilities is important in an e-bike supportive community, and those parking facilities should be able to accommodate a wide variety of bicycle styles and sizes, including electric cargo bikes. In addition to secure public parking, municipalities can encourage developers to include secure bike parking as part of their minimum parking requirements. This was recently done when council approved a development in Guelph that includes [barrier-free ramp access to 100 secure bicycle parking spaces](#).



Providing access to battery charging

Range anxiety is a common concern amongst e-bike riders traveling further distances. Access to charging facilities is important for people who want to charge their e-bike while they work, run errands, or participate in local events. Universal charging for e-bikes remains a challenge as different models of e-bikes have unique charging connectors and it is likely that, at least in North America, most e-bike riders will need to bring their charging cable with them for the foreseeable future. But this doesn't need to prevent municipalities from providing access to charging locations, such as publicly accessible plugs for e-bikes and secure battery lockers for charging. As plans for vehicle electrification move forward, municipalities can make efforts to include e-bike charging options in their electrification plans.



Participating in the cargo e-bike pilot

In Ontario, municipalities must also decide whether they want to participate in the cargo e-bike pilot program and allow cargo e-bikes in their communities. As part of the pilot, the province has outlined requirements around the size and speed of cargo e-bikes, helmet requirements and a minimum age for operators. Participating municipalities then determine where they can be used and where they can be parked, if insurance is required and how the pilot will be monitored. More information about the pilot (which runs until March 1, 2026) is available on the [Government of Ontario website](#).



Offering e-bike rebates

E-bike rebates will be covered in greater detail in the next section; however, municipalities can offer e-rebates to increase access to cycling. A lot of the focus of the rebate conversation has fallen on the federal and provincial / territorial governments to date, but municipalities can - and have - offer rebate programs as well.

E-bike cycling has changed my perspective on being outdoors in the winter. I'm 54 now and use my e-bike for grocery shopping and my husband and I both use e-bikes for exercise. I have a shoulder injury right now that is holding me back from other activities, but I can still e-bike. We wear snow suits, it's so much fun!

- Quote from a survey respondent in an [All Ages & Abilities Cycling Report](#) by the Halifax Bike Mayor and Halifax Cycling Coalition

Table 3. Sample municipal e-bike definitions

Municipality	Description of local e-bike laws
City of Peterborough	Distinguish between bicycle-style e-bikes and scooter-style e-bikes. Bicycle-style e-bikes resemble a conventional bicycle are permitted on trails if they are being pedaled whereas scooter-style e-bikes are prohibited on trails (By-Law 14-096)
Township of Severn	Distinguish between e-bikes and pedal assisted e-bikes. E-bikes can include limited speed motorcycles, but pedal assisted e-bikes must have the standard bicycle appearance (By-Law 2021-31)
City of Toronto	Distinguish between e-bikes requiring pedaling (pedelecs) under 40kg, e-bikes requiring pedaling (pedelecs) over 40kg and power assisted e-bikes. Pedelecs under 40kg are permitted everywhere that conventional bicycles are while those over 40kg are prohibited on multi-use pathways. Larger power-assisted e-bikes are prohibited from multi-use pathways and cycle tracks (see chart here).
City of Whitehorse	<p>Have adopted the 3-class system for defining e-bikes, which originates from the United States (By-Law 2021-22). This includes:</p> <ul style="list-style-type: none"> • Class 1 e-bikes (pedal-assist): motor provides assistance only when rider is pedalling and ceases to provide assistance when the bicycle reaches 32km/h. • Class 2 e-bikes (throttle-assist): motor can be used to exclusively propel the bicycle and ceases to provide assistance when the bicycle reaches 32km/h. • Class 3 e-bikes are pedal or throttle-assist bicycles that can provide assistances up to 45km/h. • Adaptive mountain bikes can be pedal-assist or throttle assist. <p>Class 1 e-bikes and adaptive mountain bikes are permitted on all trails and bicycle lanes whereas Class 2 e-bikes are permitted only on Type 1 trails, motorized multi-use trails and bicycle lanes. Class 3 e-bikes are permitted only on roadways, bicycle lanes, motorized multi-use trails and the Two Mile Hill multi-use trail.</p>



Photo: Jamie Stuckless speaking about e-bikes on TVO's The Agenda

7.0 E-BIKE REBATES

If you search for the average cost of an e-bike online, the results vary widely. The previously reported average cost of an e-bike in Canada was \$2,574^{xxxi}, however, higher-end e-bikes can cost between \$6,000 to \$10,000, depending on the features and accessories you require. This is a significant cost, and the expense of an e-bike has been identified as a barrier to e-bike uptake in multiple studies.^{xxxii}

To address this, local, regional, and national governments have started to implement incentives such as purchase rebates to help more people purchase e-bikes. Around the world, and right here in Canada, partial-purchase rebates have been the most common type of incentive offered. A snapshot of e-bike rebates is provided in Table 4.

Table 4. A snapshot of some e-bike rebates in Canada.

Name	Jurisdiction	Rebate	Additional requirements / notes
British Columbia	Provincial	<ul style="list-style-type: none"> \$1,050 rebate on e-bike purchase \$1,700 for businesses to purchase e-cargo bike, up to 5 bikes per business 	Delivered through <i>Scrap It</i> Program, must trade in vehicle for scrap to qualify for individual rebate
The Yukon	Provincial	<ul style="list-style-type: none"> 25% of cost of new e-bike, up to maximum of \$750 25% of cost of new e-cargo bike, up to maximum of \$1,500 	
Nova Scotia	Provincial	<ul style="list-style-type: none"> \$500 rebate available on e-bikes over \$1,200 To qualify motor must be a maximum of 500watts and a maximum speed of 32km/h 	E-bike must be purchased from a retailer with a physical storefront in Nova Scotia
Prince Edward Island	Provincial	<ul style="list-style-type: none"> \$500 rebate available on e-bikes over \$1,200 	Point of sale rebates are available at some retailers. People can also apply online for a rebate after the purchase.
Alberta	Provincial	<ul style="list-style-type: none"> \$500 on new electric bikes from participating retailers (minimum price of \$1,000) 	Offered through the <i>Scrap It</i> program
Québec	Provincial	<ul style="list-style-type: none"> \$2,000 to buy an electric cargo bike 	It does not appear that support for the program has been renewed
Edmonton	Municipal	<ul style="list-style-type: none"> 30% of cost of new e-bike, up to a maximum of \$750 	Cancelled after year one (was launched as a three-year program)
Saanich	Municipal	<ul style="list-style-type: none"> Rebates of \$350 to \$1,600 offered based on income tier 	Currently closed for applications
Banff	Municipal	<ul style="list-style-type: none"> Rebates of \$500 to \$1,000 based on 3 access tiers 	

There are also a variety of e-bike rebate and incentive programs offered around the world. The new [Hawaii e-bike and electric moped rebate](#) program provides rebates of up to \$500 or 20% of the retail price and a program in the

[City of Denver](#) – discussed more below – has received a lot of attention for their program offering standard and income-qualified rebates as well as rebates for adaptive e-bikes. Nearly 5,000 vouchers have been redeemed so far. In [France](#), the rebate program includes conventional bike rebates for income qualified residents, as well as rebates for business owners and for cargo bikes.

7.1 EVALUATING THE IMPACT OF REBATE PROGRAMS

There has been limited research into the impact of these rebates, however, the City of Denver conducted a survey of 1,000 residents receiving their e-bike rebate. [The results showed](#) that participants, on average, biked 26 miles per week and replaced approximately 3.4 car trips. Collectively, that equates to about 100,000 vehicle miles reduced from Denver streets each week. Almost 30% of respondents said they had previously not biked at all. Another interesting finding from the survey was that while respondents were biking more, they were dissatisfied with Denver's cycling infrastructure.

Saanich, BC also conducted [research about the impact of the e-bike incentive program](#), in partnership with the University of British Columbia. In total, 389 incentives were distributed across multiple income tiers. Feedback from participants was overwhelmingly positive about the role the program played in helping residents access e-bikes and improve their transportation affordability, convenience, and health, however, there were public concerns about the efficacy of the incentives and the low number of incentives available compared to demand. The full UBC study results are anticipated to be ready later this year, but initiative findings show that the incentive program motivated people to purchase e-bikes who would otherwise not have purchased them. People also used their e-bikes for commutes to work, school and for errands and to replace vehicle trips. Intake for the program is currently closed and recommendations for the future include offering incentives only for the income-qualified people.

There is a need for more assessment of the impact of rebate programs moving forward. This is particularly crucial to identify what kind of impact the programs are having, and how they could be adapted to meet the needs of people who need them most.



E-BIKES AS MOBILITY

[Cora Muis, Hamilton Trike](#)

Every bike or trike I sell is adaptive and many of my customers are people with disabilities. The addition of an electric assist can exponentially improve the independence and autonomy of riders and allow people to expand their range without having to worry about running out of personal energy. Some people even do better with the assist provided by having a throttle, where no pedaling is needed. When we introduce limits on throttle e-bikes or heavier e-bikes in bike lanes and on trails, it can force these riders into dangerous situations with motor vehicle traffic.



7.2 MOVING FORWARD WITH E-BIKE REBATES

Some program considerations for moving forward with more effective rebate programs include:



Partnering with local retailers to offer point-of-sale-rebates.

Asking the purchaser to cover the full cost of the e-bike up front and then apply for a rebate or wait for the rebate to be sent to them, restricts access to the program. As has been done in Denver, governments can partner with local retailers to offer point-of-sale rebates.



Including more bikes in the program.

Some rebates include conventional bicycles in their rebate programs, and others provide larger rebates for more costly bikes like adaptive e-bikes and cargo e-bikes. These inclusions can help to make rebate programs more accessible and open cycling to more people.



Evaluating the impact of rebates.

When offering a rebate, governments should commit to evaluating the impact of the program by running a survey or follow-up outreach with program participants. As has been done in Saanich, evaluation could be done in partnership with a university.



Offering much more substantial rebates and access to free e-bikes.

Most programs offer a relatively small percentage rebate, and it would be interesting to see the results of a program offering a much more significant rebate for income qualified residents. Receiving 25% back on the cost of your e-bike can certainly be helpful, but when the average cost is \$2,500 or more, that still leaves a heavy financial burden on the buyer that many potential e-bike users cannot afford. Rebates that would see the cost of an e-bike reduced to the cost of an average conventional bike (\$400 to \$600) or to be free could be much more impactful in helping more people increase their mobility through e-biking. Researchers at Portland State University identified that few, if any, programs started by asking residents what level of support would be meaningful in helping them purchase an e-bike.

I use an e-bike to commute 11km each way to and from work using mostly multi-use paved walking and cycling paths. In my fifties, the e-bike lets me pedal when I can and the hills along my route no longer stop me from using a bike. So we now are a one car family, sold the second car!

- Quote from a survey respondent in an [All Ages & Abilities Cycling Report](#) by the Halifax Bike Mayor and Halifax Cycling Coalition

8.0 TOURISM OPPORTUNITIES

E-bikes represent a significant opportunity for cycling tourism. Although there appears to be little research on e-cycling tourism specifically, multiple studies include findings that are tied to tourism, including:

- ✓ E-bikes are growing cycling, with e-bike ridership nearly doubling or more each year in the United States since 2015^{xxxiii} and the e-bike market anticipated to reach \$52.37 billion USD by 2030^{xxxiv}
- ✓ E-bikes are being used for recreation journeys and prolonging people's engagement with cycling, especially amongst adults aged 55 years and older.
- ✓ E-bikes make it easier to carry cargo and children, opening the door for more cycle tourism amongst families.
- ✓ E-bikes help people cycle further distances, which can make cycle tourism journeys more appealing and accessible.
- ✓ E-bikes can help to facilitate group riding, especially for women, who cite the ability to keep up with friends and family as a primary benefit to e-cycling.



Tourism operators can leverage the growth and benefits of e-biking by addressing some of the barriers to e-biking and clearly communicating that people on e-bikes are welcome.

One of the biggest perceived barriers to e-bike tourism is the fear of running out of power and being stuck riding a heavy e-bike without electric assistance. As mentioned in the previous section, universal charging remains a challenge and most e-bike riders will need to bring their unique charging cable with them. But there are still opportunities for tourism operators to support e-bike charging.

This includes:

- ✓ Working with local municipalities and businesses to provide places of e-bike riders to plug in their e-bikes along trails, in population centres, and near restaurants.
- ✓ Providing secure locations for e-bike charging, such as lockers where batteries can be charged.
- ✓ Including information about e-bike charging opportunities in promotional and informational materials.

Charging networks for e-bikes are currently more developed in Europe than in North America. Some manufacturers, like Bosch, have installed their own indoor charging stations for e-bikes. We've also seen efforts to provide access to secure lockers and charging cables across Germany, particularly in business centres so riders can grab lunch or shop while their e-bike charges. More information is available about e-bike charging can be found in [this eBikes International article](#).

In addition to supporting e-bike charging, tourism operators can:

- ✓ Work with municipalities to ensure that e-bikes are welcome on local trails and infrastructure. If prohibitions are in place, or if municipalities are unsure about permitting e-bikes, encourage them to conduct a pilot and evaluate the impact of e-bikes and e-bike tourists on trails and infrastructure.
- ✓ Provide clear communications about any e-bike prohibitions in marketing materials.
- ✓ Plan e-bike friendly routes. For example, while e-bikes can make it easier for people to ride on hilly terrain, their added weight from the battery and frame can make infrastructure like bike troughs much more challenging to navigate.
- ✓ Work with local municipalities and destinations to ensure that secure public bike parking is available along the route and at major destinations.
- ✓ Be welcoming to e-bikes as part of tourism experiences. As discussed elsewhere in this report, many people feel there is a stigma against riding an e-bike, and tourism operators can make it clear that they welcome and encourage people on e-bikes.
- ✓ Offer or promote local e-bike rentals. Many prospective e-bike tourists may not yet have access to an e-bike, so rentals can be a helpful option. Research shows that most North American e-bike owners tested or rode an e-bike before buying one^{xxxv} and that attitudes towards e-bikes become more positive with increased use.^{xxxvi}

The percentage of cyclists using e-bikes for our annual cycling tour has increased exponentially over the past few years. Registration for the 2023 Great Waterfront Trail Adventure (GWTA) is ongoing and we can report that 13% of registered participants have specified that they will be riding an e-bike this year. This compares to 9.3% of 2022 GWTA participants. More interesting is that 100% of participants who have indicated that they will be riding a recumbent bicycle for the GWTA in 2023 will be riding a recumbent e-bike.

We find that e-bikes allow our older participants to have an enjoyable cycling experience on the tour. We also find that our e-bike riding participants require virtually no event support apart from snacks and hydration. The only additional expectation is that we provide adequate power sources at overnight locations to allow for battery recharging.

- Jo Sharland, Tour Director, Great Waterfront Trail Adventure



STUCKLESS CONSULTING INC.

Stuckless Consulting Inc. is an Ontario-based independent consulting practice that is passionate about supporting people who are making change. We work with non-profits and governments to plan, implement, and evaluate transportation initiatives that contribute to sustainable, inclusive, and healthy communities.

Based in Hamilton, Ontario, Stuckless Consulting Inc. is a registered corporation that is owned and operated by Jamie Stuckless. We work on projects across North America, and recent highlights include:



- Helping to expand active transportation data collection and cross-jurisdictional data sharing through the development of a provincial active transportation data collection strategy for Bicycle Nova Scotia.
- Translating the collective experience of cycling education programs across Canada into a [resource hub](#) for organizations working to launch or grow their own programs.
- Facilitating community engagement for Hamilton's award-winning Complete Streets Design Guide and for a review of Nova Scotia's new Traffic Safety Act for the Atlantic Active Alliance.
- Coordinating the [Virginia Walkability Action Institute](#) on behalf of Equitable Cities.
- Co-founding and co-chairing the Canadian Policy Subcommittee for micromobility practitioners with the North American Bikeshare and Scootershare Association (NABSA).
- Participating in the Ministry of Transportation's E-Bike Working Group.

WORKING TOGETHER TO IMPROVE E-BIKE ACCESS

You've just absorbed a lot of information on e-bikes! Stuckless Consulting Inc. is available to discuss e-bike opportunities and challenges in your community. Please do not hesitate to reach out with questions and ideas.

A few of the ways we are available to help you with your e-bike journey include:

- Conducting policy reviews and developing recommendations for your community.
- Assessing the local opportunities and challenges for e-bikes.
- Evaluating e-bike and other micromobility pilot programs.
- Developing and leading data collection and monitoring strategies.
- Applying speed and conflict management strategies for multi-use trails that provide an alternative to enforcement-based approaches.
- Providing research and advocacy tools for talking about e-bikes.
- Hosting e-bike test opportunities and e-bike rides for local officials and policy makers.

Visit jamiestuckless.ca for more information on Stuckless Consulting Inc. and our services.

THANK YOU FOR READING THIS REPORT!

**We look forward to hearing from you.
Please reach out with any e-bike questions.**



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