Effectiveness Review

E-Scooters (Declaration Not to be Motor Vehicles) Notice 2018 Review

15 September 2023

More information

Waka Kotahi NZ Transport Agency

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Introduction

The E–Scooters (Declaration Not to be Motor Vehicles) Notice 2018, which came into effect on 18 September 2018, specifies that e-scooters that meet the criteria in the Notice have been deemed not to be "motor vehicles" for the purposes of the Land Transport Act. The effect of that Notice is that e-scooters have been able to be ridden on footpaths, have not been required to be registered and users have been able to ride them without holding a drivers licence. E-scooters that are wheeled recreational devices are able to be used on footpaths, according to the Land Transport (Road User) Rules 2004.

Initially, e-scooters were primarily introduced through share scheme trials in major cities. But the use of e-scooters grew quickly in popularity, resulting in schemes becoming available in smaller locations and an increase in privately owned e-scooters. By 2019, it was reported that around 65,000[1] new e-bikes and e-scooters had been imported into New Zealand - nearly 18,000 more than had been reported in 2018.

This Notice is due to expire in September 2023, and Waka Kotahi needs to decide whether it will renew the declaration or not.

To assist with this decision, Waka Kotahi carried out a broad review of the effectiveness of e-scooters. This review will assess the effectiveness of e-scooters across a range of different factors and help inform whether the Notice should be renewed or not.

Methodology

This assessment considers the effectiveness of e-scooter use in NZ through the following lenses:

- **Use of e-scooters in New Zealand** – how they are used, and how often (includes both rental e-scooters and privately owned e-scooters).
- **Cost Effectiveness** – e-scooter affordability (purchasing and renting) and how this cost compares to other modes.
- **User Satisfaction** – how do users and non-users feel about using e-scooters or being around e-scooter users.
- **Regulation and Enforcement** – what are current rules, and how does regulation and enforcement of e-scooters respond to safety concerns and non-compliance.
- **Environmental impact of e-scooters and contribution to mode shift** – impact of e-scooter use on carbon emissions, energy consumption, waste and how e-scooters help people move from private vehicles to other modes

Each of these lenses have questions attached to them which we will attempt to answer with the information we have available.

We will answer these questions with a focus on the New Zealand experience. For full clarity, this review looks at existing data, reports, and information about e-scooters in New Zealand (and overseas where applicable), that is available online.

The effectiveness review does not include a safety lens, because a separate safety review has been carried out. But some lenses may include information about how safety is impacted.

Limitations of the review

Processes to collect data and information about micro-mobility are still developing.

[1] It isn't clear how many of the 65,000 are e-scooters, but some predict this number to be around 40% (ViaStrada (2022)

The sector has, over time, developed reporting mechanisms for how e-scooter share schemes are used in New Zealand and a lot of this information is publicly available. However, we still do not have a full picture of how privately owned e-scooters are used in New Zealand, and how their use impacts others. A lot of this information is currently based on the results of surveys that are location focussed (e.g. from surveys in Auckland, and Christchurch). While we have referred to this information in this review, it is important to note that this might not be fully representative of how privately owned e-scooters are used in areas outside the reach of these surveys.

This review also only looks at information available online. There were no interviews, surveys, or field work carried out to support this review because this was not in scope.

Use of e-scooters in New Zealand

Share schemes

How many towns and cities currently operate share schemes?

16 councils in New Zealand currently have e-scooter share schemes operating on their streets. This includes the following:

Table 1: Operators in New Zealand cities and start date

Town/city/district	Has had e-scooters since	Has current contracts with
Auckland	2018	Beam and Lime
Christchurch	2018	Neuron and Lime
Dunedin	2019	Neuron
Hamilton	2019	Lime
Hutt Valley	2018	Lime
Napier	2022	Beam
Palmerston North	2021	Beam and Lime
Porirua	2023	Beam and Flamingo
Queenstown	2023	Beam
Selwyn	2020	Lava (uses Bird e-scooters)
Taupo	2019	Beam
Tauranga	2020	Lime
Waimakariri	2021	Flamingo
Wellington	2019	Beam and Flamingo
Whanganui	2023	Beam
Whangarei	2021	Beam

On average, how often are [share scheme] e-scooters used per day?

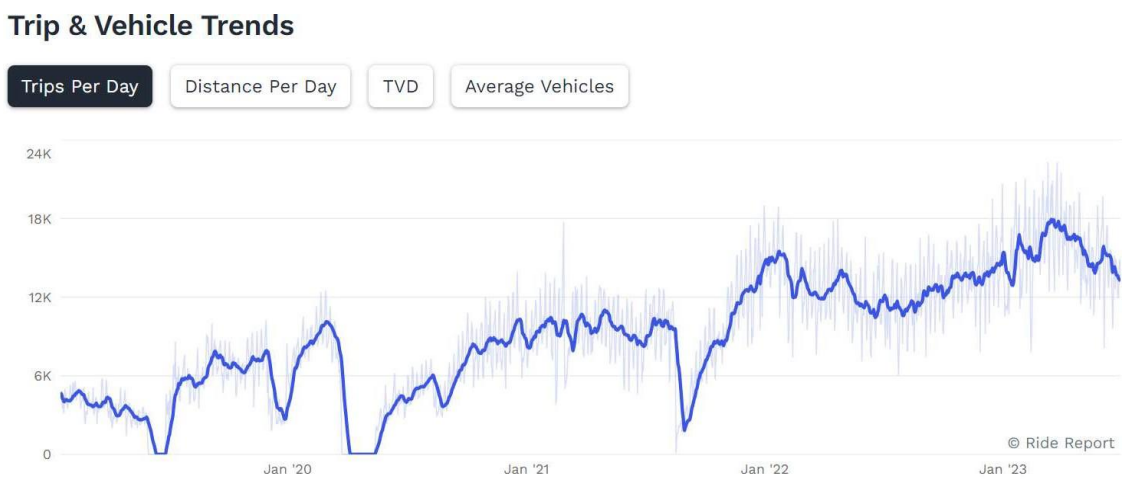
Ride Report, an online platform that helps to track and evaluate shared e-scooter, bike, and car programmes, collects information about how e-scooters are used from 13 of the councils listed above.[2] This includes Auckland, Christchurch, Dunedin, Hamilton, Napier, Palmerston North, Selwyn, Taupo, Tauranga, Waimakariri, Wellington, Whanganui, and Whangarei.

[2] Please note that Ride report data is not inclusive of all share scheme data that is available and does not include information about privately owned e-scooters. However, the report does include up to date data from major ride share operators in New Zealand, including Beam, Flamingo, Lime and Neuron.

Tables 2 and 3 and Figure 1 (below) provides an overview of how many trips have been taken across NZ in total and breaks this down by region.

Table 2: Overview of active trips taken across NZ - January 2019 and June 2023			
Active vehicles[3]	**Trips per vehicle per day**	**Trips per day**	**Trips total**
5,792	2	11,600	14,691,800

Figure 1: Overview of trips taken across NZ between January 2019 and June 2023



**note that some of the increase in trips is due to more regions and e-scooters being added to this platform.*

Table 3: Overview of average trips taken by region				
Town/city/district	**Active vehicles**	**Trips per vehicle, per day**	**Trips per day**	**Trips total**
Auckland	1,470	2.27	3,400	8,370,884
Christchurch	1,125	2.04	2,200	3,512,900
Dunedin	287	1.35	400	466,100
Hamilton	404	1.51	600	588,900
Napier	219	1.28	300	48,300
Palmerston North	608	1.47	900	505,300
Porirua	156	0.97	200	14,100
Selwyn	51	0.85	<50	55,300
Taupo	190	1.46	300	47,300
Tauranga	313	1.78	500	489,700
Waimakariri	143	1.01	100	83,300
Wellington	567	4.19	2,300	2,983,500
Whanganui	61	0.82	100	16,500
Whangarei	199	1.59	300	160,300

[3] Active vehicles = average number of active shared vehicles. Active vehicles refers to vehicles that are available to rent.

What is the total distance of trips?

Ride Report advises that people riding rental e-scooters have travelled a total of 23,377,776 kilometres between January 2019 and June 2023. Table 3 provides a breakdown of this distance travelled across regions:

Table 4: Total distance travelled by e-scooter by region	
Town/city/district	**Total distance travelled (km)**
Auckland	8,370,884
Christchurch	5,641,379
Dunedin	678,960
Hamilton	729,897
Napier	122,658
Palmerston North	1,046,586
Porirua	28,097
Selwyn	105,758
Taupo	57,981
Tauranga	844,677
Waimakariri	141,182
Wellington	5,152,828
Whanganui	417,481
Whangarei	417,481

What is the average distance (or timespan) of trips?

Data suggests that initially, most trips taken via rental e-scooter were relatively short, with the median average distance of trips sitting at between 0 – 2km. For example, Auckland Transport (2019) found that median trip distance for e-scooters during their second trial was 919 metres, and the median trip duration was around 7 min 25 seconds. Likewise Christchurch City Council (2019) reported that trips taken during their trial averaged 10 minutes or less.

Ride Report records that over the last year, the average distance per trip and average of median distance on a national and regional scale sits around 1 – 2km (as noted in table 4 and 5 below). This means that most trips taken via e-scooter are still relatively short.

But *Ride Report* data also shows that more people are using e-scooters for longer trips. For example, over the last year, 139,174 trips taken were between 4 – 5km, and 25,889 trips were over 10km (as noted in tables 6, 7a and 7b below). This suggests that while many e-scooter trips can cover shorter distances, or "last mile" trips, e-scooters have a place in providing for trips that could be taken via car, or as a mode for medium trips when other options are not available.

Table 5: Total trips and average distance 30 Aug 2022 – 29 Aug 2023 (National)	
Total trips	4,879,717
Average of median distance	1.36km
Total distance travelled	7,898,976km
Average distance	1.62km

Table 6: Average of median distance travelled across regions	
Town/city/district	**Median distance**
Whanganui	1.579km
Napier	1.758km
Palmerston North	1.347km
Wellington	1.218km
Tauranga	1.136km

Selwyn	1.306km
Christchurch	1.251km
Auckland	1.003km
Waimakariri	1.287km
Dunedin	1.347km
Whangarei	1.72km

Table 7a: Number of trips per distance 30 Aug 2022- 29 Aug 2023 (National)	
Distance (groups)	**Number of trips**
<0km	0
0-1km	2,131,766
1-2km	1,526,401
2-3km	603,597
3-4km	264,073
4-5km	139,174
5-6km	786,694
6-7km	48,159
7-8km	30,352
8-9km	18,966
9-10km	12,646
>10km	25,889

Table 7b: how many trips taken based on distance (by region)						
Distance	**Auckland**	**Christchurch**	**Dunedin**	**Napier**	**Palmerston North**	**Tauranga**
<0km	0	0	0	0	0	0
0-1km	1,016,371	396,552	54,475	16,260	106,307	93,373
1-2km	622,629	283,837	50,925	12,895	80,735	50,504
2-3km	204,283	135,139	23,197	8,210	43,180	25,750
3-4km	82,890	65,411	9,478	5,594	24,339	13,788
4-5km	42,136	36,765	5,678	3,617	12,777	7,955
5-6km	24,101	21,431	3,262	2,177	6,043	5,165
6-7km	15,657	13,626	1,390	1,304	3,479	3,699
7-8km	10,609	8,548	757	860	2,141	2,217
8-9km	6,785	5,219	434	619	1,283	1,201
9-10km	4,509	3,454	272	462	895	789
>10km	9,559	6,622	598	1,087	2,078	1,526

Table 7c: how many trips taken based on distance (by region)					
Distance	**Whanganui**	**Wellington**	**Selwyn**	**Waimakariri**	**Whangarei**
<0km	0	0	0	0	0
0-1km	3,577	93,373	3,550	18,229	23,345
1-2km	3,154	50,504	3,514	19,047	21,971
2-3km	1,868	25,750	1,395	7,602	13,220
3-4km	1,162	13,788	681	2,872	7,147
4-5km	513	7,955	208	1,045	4,999
5-6km	342	5,165	122	488	3,425
6-7km	196	3,699	67	317	2,137
7-8km	106	2,217	31	196	1,317
8-9km	81	1,201	33	132	747

9-10km	59	789	17	87	511
>10km	218	1,526	43	169	994

What is the average speed of trips?

Field work has found that the average speed of e-scooters is typically double walking speed. For example Auckland Transport (2019) reported that the average speed on any given trip in Auckland was around 8km/h (on footpaths). By comparison, average walking speed is around 4-5km/h, and jogging speed is typically between 8-11km/h.

Ride Report also collects data about the average speed of trips. Table 8 (below) provides a breakdown of average speeds across regions – the lowest average speed is 8.28km/h (Tauranga), while the highest average speed 12.66km/h (Selwyn District, outside of Christchurch).

Unfortunately, *Ride Report* does not publicly report on speed ranges, so it is difficult to gauge how slow e-scooters can travel without causing balance issues, or how fast some users might travel.

Table 8: Average speed of users across regions

Town/city/district	Average speeds
Auckland	8.29km/h
Christchurch	9.59km/h
Dunedin	9.9km/h
Hamilton	9.5km/h
Napier	10.62km/h
Palmerston North	10.79km/h
Porirua	10.44km/h
Selwyn	12.66km/h
Taupo	10.46km/h
Tauranga	8.28km/h
Waimakariri	12.08km/h
Wellington	11.76km/h
Whanganui	11.15km/h
Whangarei	10.81km/h

ViaStrada (2022) conducted surveys in Auckland, Wellington, and Christchurch to understand the speeds e-scooter and e-bike riders travel on shared paths, bus lanes and roads.

This work found that speeds on shared paths and cycles paths are much faster than the average speeds recorded by *Ride Report*, which suggests that e-scooter users ride on the footpath at slower speeds but are able to travel faster on shared paths and cycle paths, given that footpaths are recorded as the space where most people ride.

Results also found that e-bike riders tend to travel faster than e-scooters in these spaces (e-bike riders average 29.7km/h on flat terrain and 20.3km/h on hilly terrain compared with 23.3km/h and 18.7km/h for e-scooters). Non-powered bike riders tended to travel at similar speeds to e-scooter users on flat terrain (average of speeds of 24.5km/h) but slower on hilly terrain (average speeds of 11.8km/h). Results also found that male and females e-scooter riders also travel at similar speeds on flat terrain. Figures 2 and 3 below provide a break-down of these averages.

Figure 2: average speed and proportion of e-bike and e-scooter use at three hilly sites (source ViaStrada 2022)

	E-powered			Unpowered	All riders	Bike speed difference
	Bike	Scooter	Total	Bike		
Mixed traffic - Brooklyn Road, 11% average grade, about 400 m from start of hill						
Avg. speed (km/h)	17.3	12.0	17.2	9.3	13.4	8.0
Observations	30	1	31	29	60	
Proportion	50.0%	1.7%	51.7%	48.3%	100%	
Shared bus lane - Glenmore Street, 6% average grade, about 800 m from start of hill						
Avg. speed (km/h)	21.4	17.5	21.1	10.9	14.1	10.5
Observations	25	2	27	58	85	
Proportion	29.4%	2.4%	31.8%	68.2%	100%	
Separated cycleway - Constable Street, flat portion after short 14% grade						
Avg. speed (km/h)	23.6	21.7	23.3	17.4	20.3	6.2
Observations	19	3	22	23	45	
Proportion	42.2%	6.7%	48.9%	51.1%	100%	
All sites						
Avg speed (km/h)	**20.3**	**18.7**	**20.2**	**11.8**	**15.4**	**8.5**
Observations	**74**	**6**	**80**	**110**	**190**	
Proportion	**38.9%**	**3.2%**	**42.1%**	**57.9%**	**100%**	

Figure 3: average speeds (km/h), number of observations and gender proportions – flat sites 2020

	E-powered				Unpowered				Grand total	Bike diff.
	Bike	Scooter	Other	Total	Bike	Scooter	Other	Total		
Female										
Avg. speed (km/h)	28.1	23.0		27.4	21.4			21.4	22.9	6.7
StdDev.	5.5	4.8		5.6	4.7			4.7	5.6	
Proportion	21.1%	3.7%		24.7	75.3%			75.3%	100%	
Observations	92 (43.8%)	16 (34.8%)		108	329 (27.6%)			329	437	
Male										
Avg. speed (km/h)	30.9	23.4	21.0	29.5	25.6	8.0	17.0	25.6	26.2	5.3
StdDev.	5.1	5.3		5.9	5.4			5.4	5.7	
Proportion	11.7%	2.6%	0.1%	14.4%	85.4%	0.1%	0.1%	85.6%	100%	
Observations	118 (56.2%)	26 (56.5%)	1	145	862 (72.4%)	1 (33%)	1	864	1009	
Unknown gender										
Avg. speed (km/h)		23.8	39.0	26.8		12.0	15.7	14.2	20.5	
StdDev.		1.3		6.9		2.8	0.6	2.5	8.2	
Observations		4 (8.6%)	1	5		2 (66%)	3	5	10	
All genders										
Avg. speed (km/h)	29.7	23.3	30	28.5	24.5	10.7	16.0	24.4	25.2	5.2
StdDev.	5.4	4.8		5.9	5.5	3.1	0.8	5.6	5.9	
Observations	210 (100%)	46 (100%)	2	258	1191 (100%)	3 (100%)	4	1198	1456	
Male – female difference										
km/h	2.8	0.8			4.2				3.3	

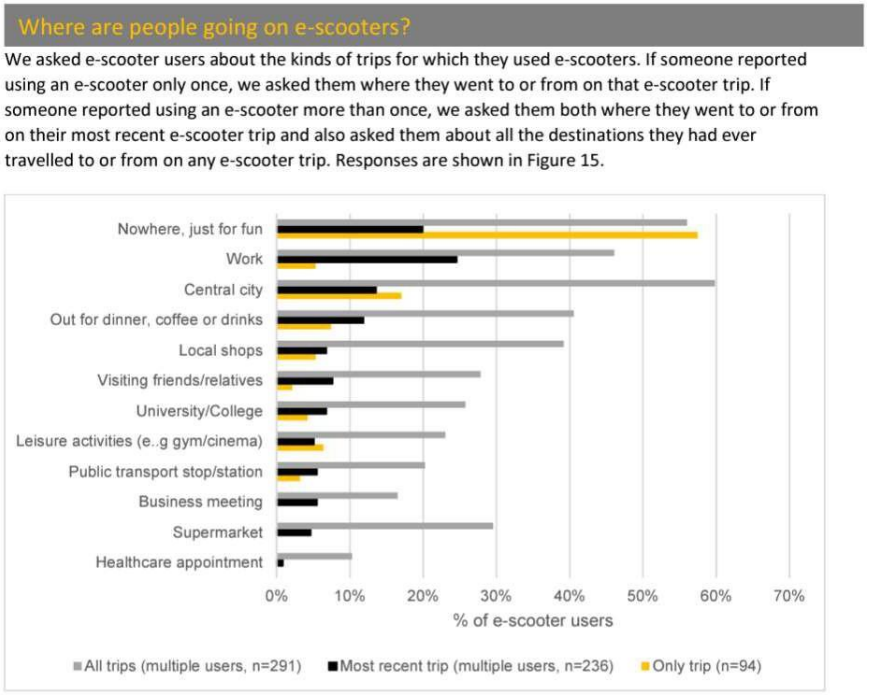
What do people use rental e-scooters for and what do trips look like?

A number of surveys have investigated why e-scooter trips are taken.

For example, Fitt and Curl (2019) found that first time users were more likely to ride an e-scooter for fun. Subsequent use was still likely to be motivated by fun, but some respondents were more likely to note practical considerations like e-scooters being quicker or more convenient than an alternative mode. Fitt and Curl note that this change in focus suggests that we might see people's reasons for using e-scooters evolving over time and that e-scooters may gradually become less of a novelty and more of a practical transport option integrated into everyday transport choices.

This research also found that if an e-scooter was used more than once, users were more likely to use them to travel to work, social engagements, shops or supermarkets. The figure below provides a summary of what survey respondents said:

Figure 4: Where are people going on e-scooters (sourced from Fitt and Curl 2019)



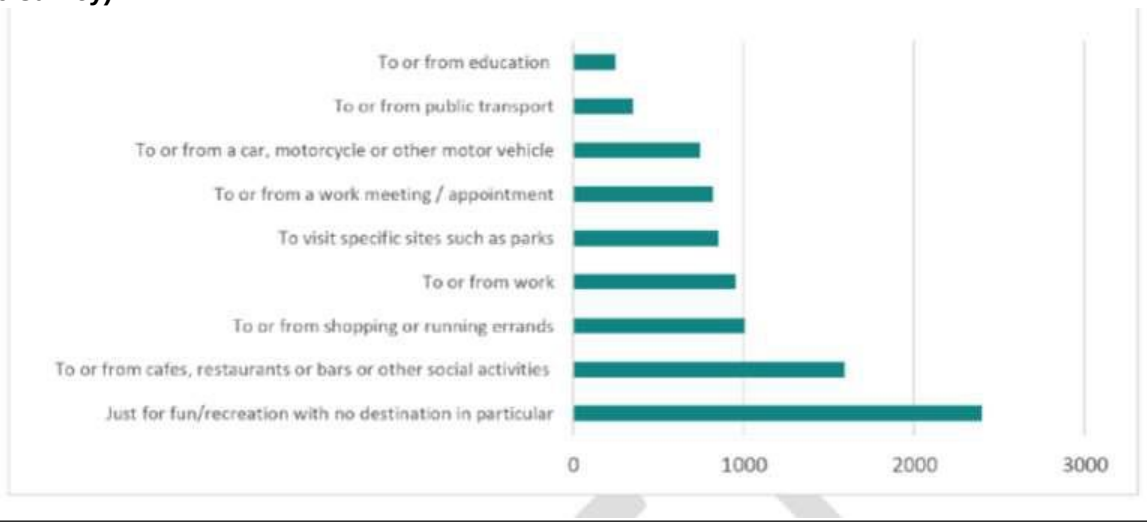
Survey data collected by Auckland Transport (2019) reported that rental e-scooters were primarily being used for short trips within the city centre and adjacent suburbs. Lower Queen Street, downtown and the viaduct had the highest number of trips. Survey results as part of this work also found that:

- 60 per cent of users reported having used rental e-scooters purely for fun. This was particularly the case with one-off and occasional (less than monthly) users.
- Regular users (monthly or more) were more likely to have used rental e-scooters for functional trips: about a third of regular users reported using rental e-scooters to travel to or from cafes, restaurants or bars; public transport; or work; and a quarter reported travelling to or from specific sites such as parks; shopping or running errands; or a work meeting / appointment.
- 20 per cent of users report accessing public transport as one of their main uses of rental e-scooters, with 53 per cent interested in doing so.

A survey carried out by Christchurch (2019), as demonstrated in Figure 5, found that:

- Most users reported using the e-scooters for fun and recreation (55%).
- Some users used e-scooters for getting to/from hospitality locations or other social activities (36.7%).
- 40% of users also reported that they would have walked had the scooters not been available on their most recent trip.

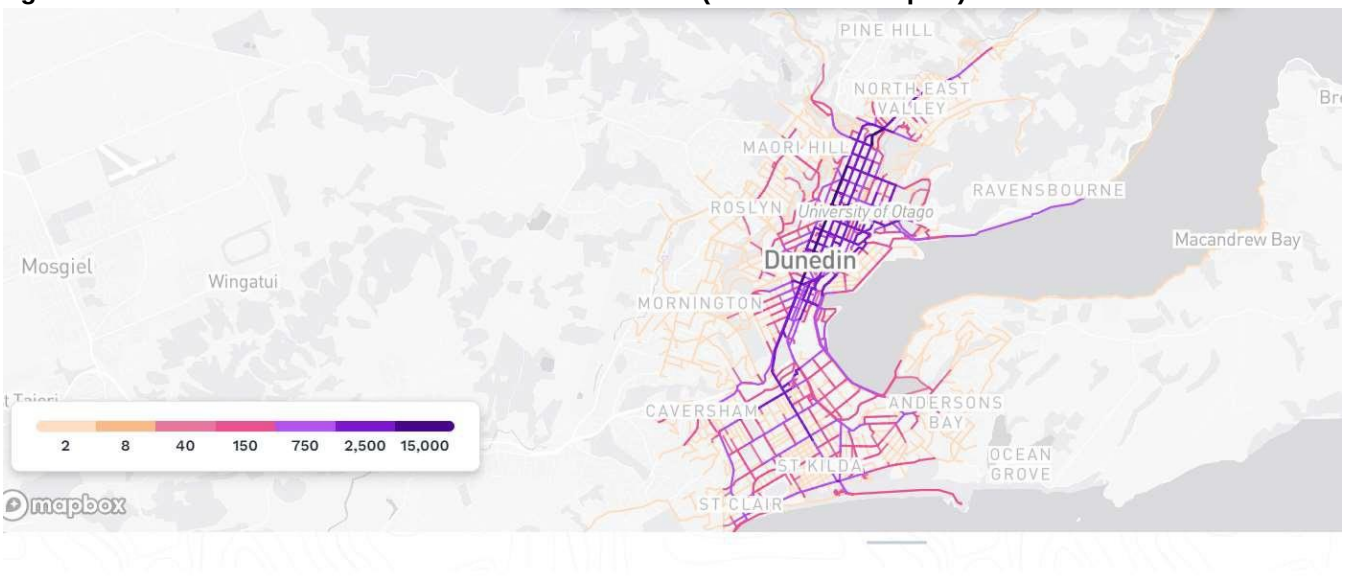
Figure 5: Main types of trips taken on e-scooter in Christchurch (sourced from Christchurch 2019 survey)



Research undertaken by Beam (2022) reports that of Auckland residents who live and work within Beam's operational area, 79% have ridden a shared e-scooter with 37% using these at least once a week. The group most likely to ride frequently were those aged 30 – 44. According to Beam, at least 50% of trips are used for commuting.

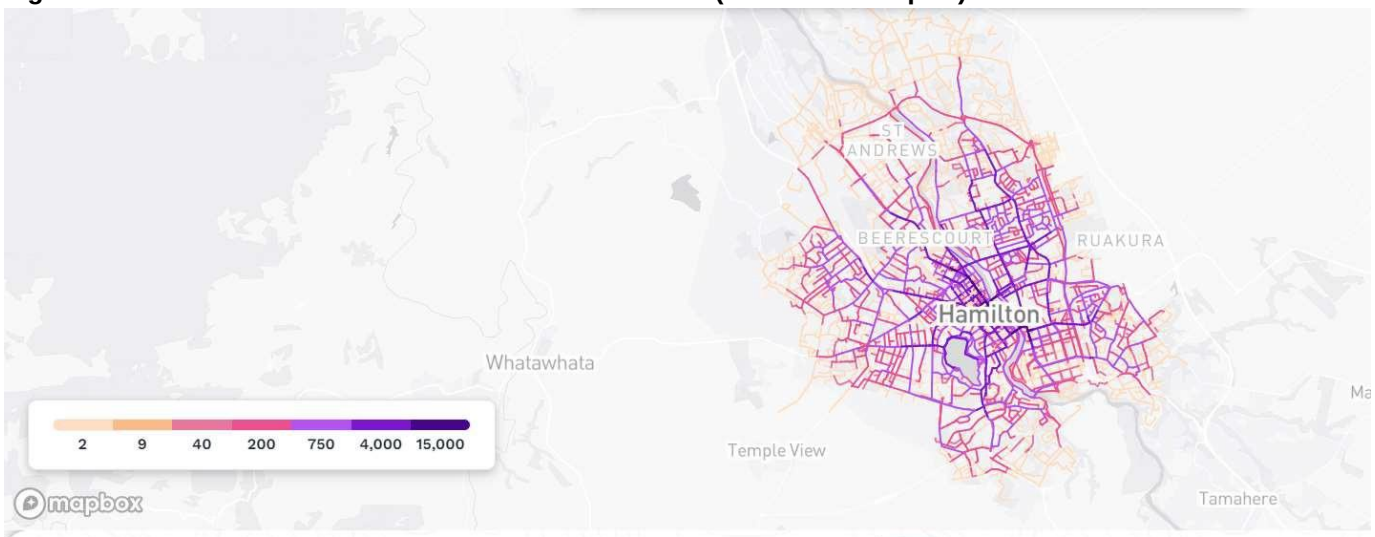
Ride Report data shows that in most instances, e-scooter use is typically based in city centres – but there are some differences across regions. For example, while Dunedin records highest e-scooter use in its city centre, high usage also occurs around outer suburbs where students are located, and around protective scenic routes like the shared path out towards Ravensbourne. Figures 6, 7, 8 and 9 provide an overview of where e-scooters are predominately used in Dunedin, Hamilton, Selwyn, and Whangarei.

Figure 6: Areas in Dunedin where e-scooters are ridden (source – ride report)



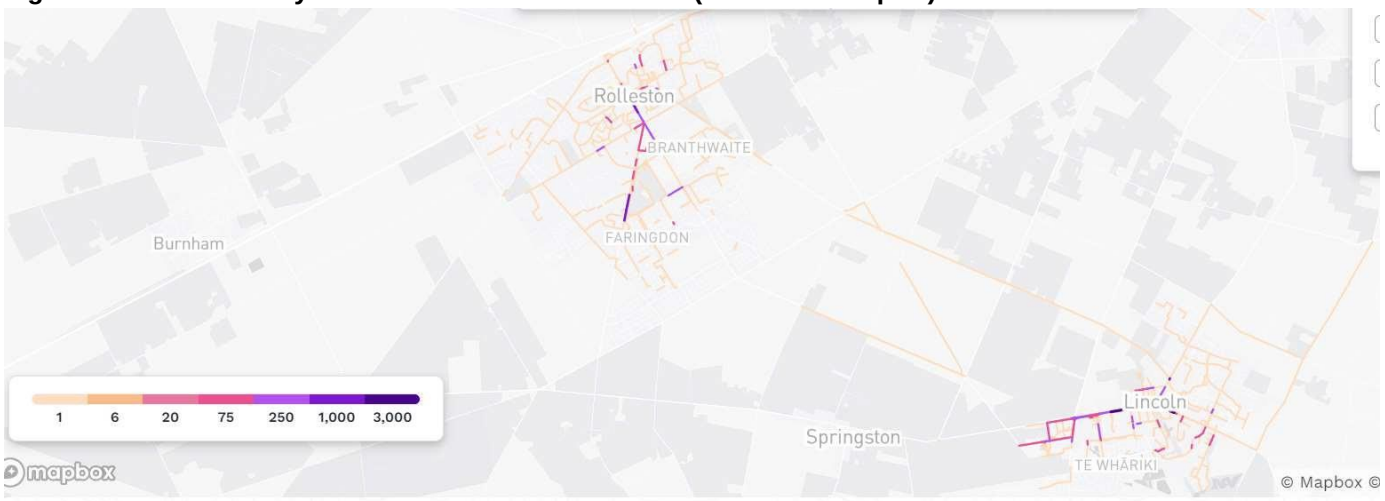
Population	Average Vehicles	Total Trips	Total Distance
133,300	287 vehicles	466,100 trips	678,960 km

Figure 7: Areas in Hamilton where e-scooters are ridden (source Ride report)



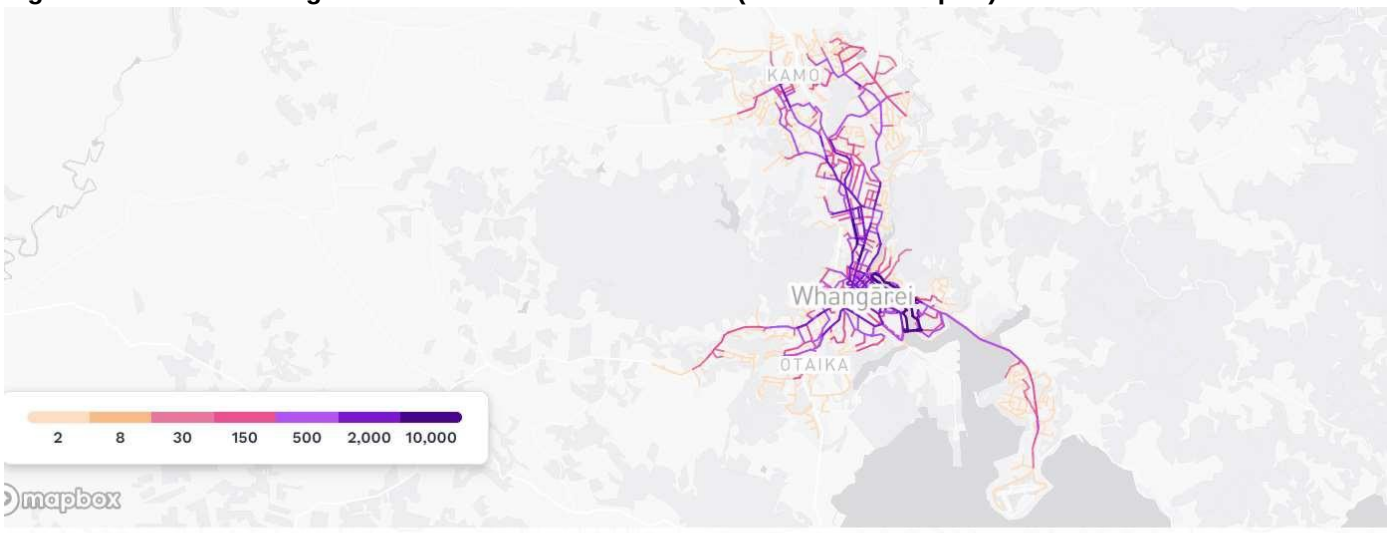
Population	Average Vehicles	Total Trips	Total Distance
165,400	432 vehicles	611,800 trips	1,224,005 km

Figure 6: Areas in Selwyn where e-scooters are ridden (source ride report)



Population	Average Vehicles	Total Trips	Total Distance
65,600	51 vehicles	55,300 trips	105,758 km

Figure 7: Areas in Whangarei where e-scooters are ridden (source Ride Report)



Population	Average Vehicles	Total Trips	Total Distance
50,900	199 vehicles	160,300 trips	417,481 km

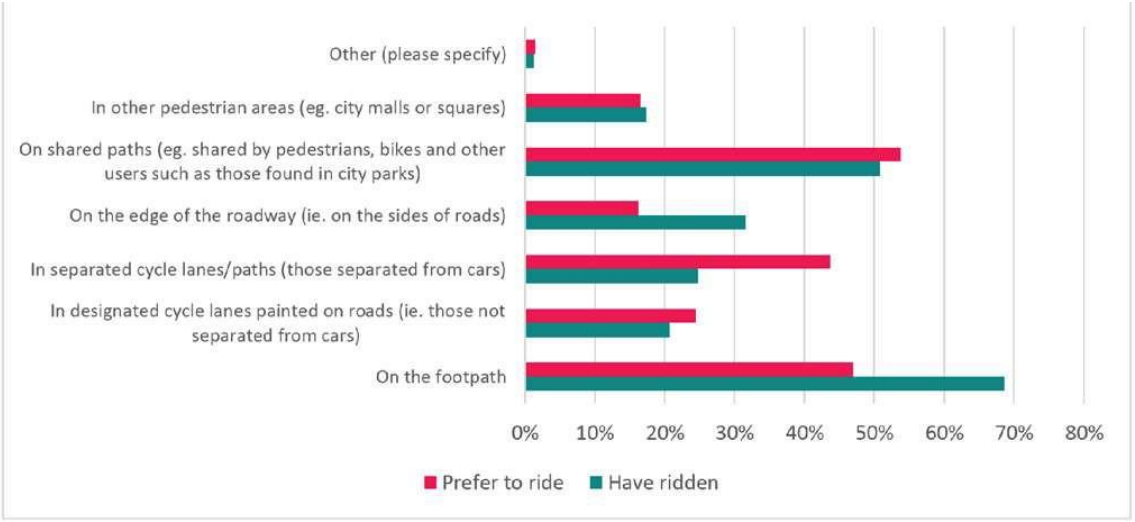
What spaces are e-scooters used in currently?

Auckland Transport carried out an observational study in 2019 to see how e-scooter riders used different spaces. Notably, they found that 86% of users used the footpath rather than the road when these were the only two options. But when protective paths were available (for example, the Quay Street protected cycle path) 86% of users used this space while only 12% were observed riding on the footpath.

Likewise, a survey of 4336 respondents conducted by the Christchurch City Council in 2019 found that most people reported they rode e-scooters on footpaths because this was the best option available to them. But these users also reported that using a shared path or cycle path would be their preferred

location for riding an e-scooter if this was available. Christchurch has recorded this information in the table below.

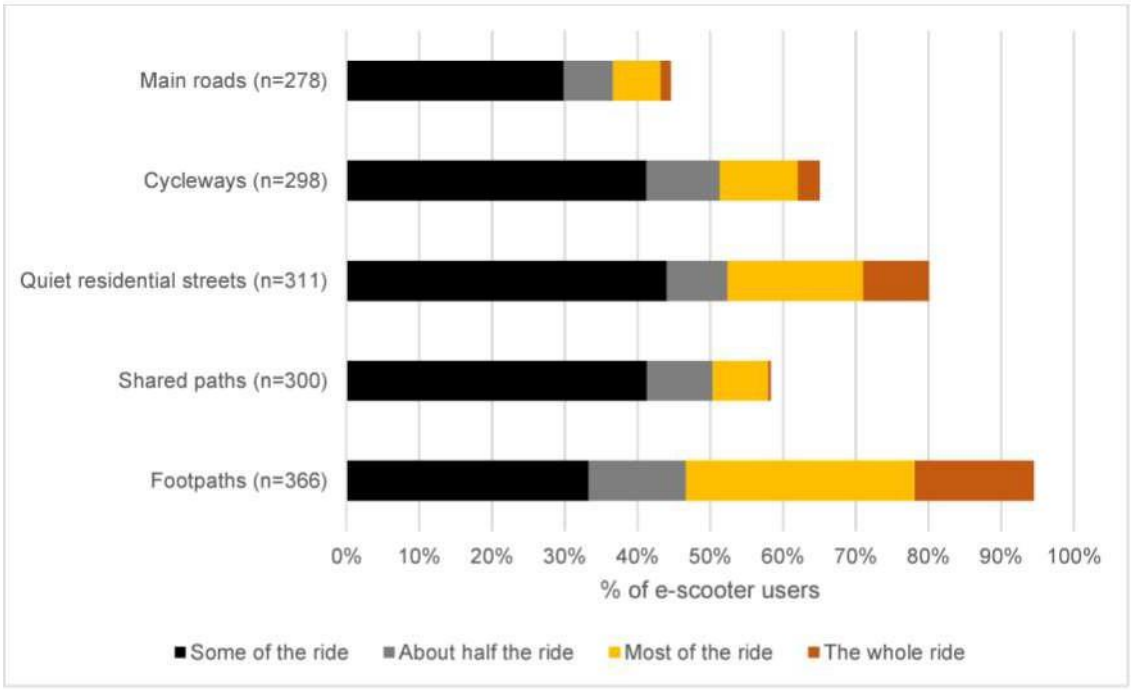
Figure 9: Actual vs preferred locations to ride an e-scooter (source Christchurch City Council)



Fitt and Curl (2019) also found that most users rode on footpaths, closely followed by quiet residential streets.

At the time of their survey, over 90% of e-scooter users surveyed had ridden on footpaths for at least part of their journey. However, only around half (51%) of users and 26% of non-users thought that the footpath was an appropriate place to ride an e-scooter. Most respondents thought that cycleways, shared paths and quiet streets were more suitable environments to ride e-scooters.

Figure 8: where users ride their e-scooters (source Fitt and Curl 2019)



Privately owned e-scooter use

Do we have any information about privately owned e-scooters currently in use in towns and cities?

There is limited information available about how many people in New Zealand have purchased and use their own e-scooter.

Interest in purchasing e-scooters has increased significantly over the last couple of years. For example, it was reported in 2019 that around 65,000 e-bikes and e-scooters had been imported into New Zealand – nearly 18,000 more than had been reported in 2018. ViaStrada (2022) predicts that out of these e-bike and e-scooter imports, about 40% were e-scooters.

According to PriceSpy's historical click data, the shopping category of 'electric scooters' was 86%more popular than that of 'electric bikes' between 1st December 2019 and 23rd February 2020 (93% vs 7%).

We also know that surveys include information about privately owned e-scooters, so the information above provides some context but is not fully applicable.

A review of PriceSpy's information also shows that there are around 36 different types of e-scooters currently available for purchase as outlined in table 9 below.

What is notable about these privately owned e-scooters is that many of them have a maximum power output greater than 300W. The 2018 declaration only applies to devices with a maximum power output of up to 300W, which means that 18 models of the e-scooters currently available for purchase appear to not comply with the 2018 declaration, unless used with a controller that will limit speed and therefore maximum power output. In the absence of this controller, the devices are not permitted to be used in a public place.

In addition to this, the Land Transport Act only gives Waka Kotahi the power to declare that a device is not a motor vehicle is if it has a maximum power output of up to 600W. This means that there are currently at

least seven models of e-scooters on the market that Waka Kotahi does not have any power to consider for a declaration.

Table 9: types of e-scooters on the NZ market for private purchase					
Brand	**price**	**Power output**	**Top speed**	**Range**	**Weight**
Xiamomi Mi Electric scooter 4 pro	$1,298.99	700 watts	25km/h	45km	13kg
Segway Kick Scooter Max G30	$1,498.99	350 watts	25km	65km	18.7kg
Mi electric Scooter pro 2	$985.00	300 watts	25km/h	45km	14.2kg
Niu KQi3 Pro	$1,299.00	350 watts	20km/h	unknown	20.4kg
Mi electric Scooter 3 Lite	$698.99	300 watts	25km/h	unknown	13kg
Ninebot by Segway Kick Scooter F30	$998.99	400 watts	25km/h	unknown	unknown
Xiaomi Mi Electric Scooter 4	$878.00	600 watts	25km/h	35km	12kg
NIU KQi2 Pro	$999.00	600 watts	25km/h	40km	unknown
Ninebot by Segway Kick Scooter P65D	$1,848.99	500 watts	40km/h	65km	unknown
Ninebot by Segway Kick Scooter F25	$849.00	300 watts	25km/h	20km	12.5kg
Segway ES4	$994.99	300 watts	30km/h	45km	14kg
Ninebot by Segway Kick Scooter F40	$1,198.99	350 watts	30km/h	40km	15.8kg
Segway Kick Scooter F25E	$849.00	250 watts	25km/h	25km	15.3kg
Razor Power Core E100	$399.00	100 watts	18km/h	40km	12kg
Ninebot by Segway Kick Scooter GT1	$4,799.00	3000 watts	60km/h	70km	unknown
Ninebot by Segway Kick Scooter GT2	$6,499.00	6000 watts	70km/h	90km	53kg
NIU KQi3 Sport	$1,099.00	600 watts	25km/h	40km	unknown
Inokim Light 2 Super	$1,599.00	350 watts	35km/h	40km	13.6kg
Ninebot by Segway Kick Scooter P100	$2,849.00	650 watts	48km/h	100km	unknown
Razor E-Prime Air	$1,099.99		24km/h	12km	unknown
Mi Electric Scooter 3	$822.00	300 watts	35km/h	30km	13.2kg
Razor E Prime 36V	$1,099.00	250 watts	29km/h	24km	11kg
Segway C10	$399.99		16km/h	10km	8.1kg
Razor E Prime III 36V	$879.99	250 watts	29km/h	24km	11kg
Razor Power Core E90	$319.00	90 watts	16km/h	20km	11.65kg
Razor E Prime Air 36V	$891.68	250 watt	29km/h	24km	unknown
E-Twow Booster GT	$1,699.00	700 watts	40km/h	50km	12.3kg
Mi Electric Scooter M365 Pro 2	$985.00	300 watts	25km/h	45km	14.2kg
Razor Power Core E195	$599.00	150 watts	19km/h	16 km	12.6kg
Mi electric Scooter Essential	$644.99	250 watts	20km/h	20km	12kg
Kaabo Mantis 8 Plus	$2,195.99	800 watts	50km/h	60km	25.6kg
Vsett 10+	$3,499.00	2x 1400 watts	80km/h	90km	39kg
Xiaomi Mi Electric Scooter 4 Ulta	$2,085.99	500 watts + 940 watts	25km/h	70km	24.5kg
Xiamoi Mi Electric Scooter 4 Lite	$947.49	300 watts	25km/h	20km	15.6kg
Mi Electric Scooter M365	$1,056.76	500 watts	25km/h	30km	12.5kg
Razor E300	$899.00	250w	24km/h	30km	20.1kg

How are privately owned e-scooters used?

There is limited information about how privately owned e-scooters are used, but studies or surveys suggest that people using their own e-scooters are more likely to use the road than the footpath, and are often used for commuting, or for social trips. However, it is difficult to determine whether this view applies everywhere as many of these assumptions are made based off reporting in Auckland.

Discussion

Many people around New Zealand use e-scooters for fun, socialising, commuting, or as an alternative mode when other options are not available.

Between January 2019 and June 2023, a total of 23,377,776 kilometres were travelled on rental e-scooters. While we don't have information about the total distance travelled by privately owned e-scooters, based on their growth in popularity over the last few years, we can assume that the total distance travelled across the country by all e-scooters (rental and privately owned) is actually much higher than the 23,377,776 kms recorded by *Ride Report*.

E-scooter use around regions can also differ and respond to particular needs. For example, e-scooters in Dunedin are helpful in offering alternative travel for students.

Overall, e-scooters provide a number of positive benefits, and the continuing growth in use suggests that e-scooters have surpassed their status as a 'novelty' that people use time to time for fun, to a legitimate transport option, and a part of the transport system

While there are plenty of positives for e-scooter use, however, there is still room for improvement in some areas. First, the ability to collect data and the information available about privately owned e-scooters is limited. Collecting data on private ownership may help us to better understand how privately owned e-scooters contribute to transport needs and their effectiveness on the transport system as a whole.

Second, the lack of information about privately owned e-scooters makes regulation difficult, as evidenced by the current import of devices that do not comply with the 2018 declaration. More information would therefore likely aid Waka Kotahi and MBIE when deciding how to respond to the range of e-scooters available on the market.

Third, we have limited information about the speeds e-scooters typically travel in spaces like on the footpath, shared paths and roads. While *Ride Report* collects information about the average speed of rental e-scooters, we don't have information about how this differs, and we have no clear data about the speed of privately owned e-scooters. Speed is often reported as the greatest safety concern to non-users, and having better monitoring tools to manage speeds may help Waka Kotahi and councils to manage speeds in high-risk areas more easily. Creating a spatial/speed distribution dataset would likely aid Councils when addressing safety concerns around the speeds of e-scooters.

It would also be helpful to collect more information about where e-scooters are used to help identify where e-scooters could be integrated into trips by region. The limited information we have illustrates that e-scooter use can differ region to region, so the expectation that e-scooters provide a last mile trip or replace car trips may not be appropriate in all regions – for example, they may instead provide support to an under-resourced public transport network while improvements are occurring. More information and data collection can help regions to utilise rental e-scooters as a way to support their transport system.

Cost effectiveness

How much does it cost to purchase and run an e-scooter?

Share scheme/rental e-scooters.

E-scooter for hire companies typically charge users twice – once to unlock the device, and again for each minute of the trip. Many e-scooter operators also provide discounts or passes for different users. For example, providing cheaper rates for students or SuperGold card holders.

The table below outlines how much each share scheme charges for services in Wellington, plus any discounts or deals that are available to users.

Operator	Unlock price	Price per minute	Passes	Discounts and deals
Beam	$1.00	$0.65	Universal passes – allows up to 120 minutes riding day, no unlocking fees. 3-day pass: $29.95 over 3 days Weekly pass: $39.95 a week Month pass: $4.99 a month – no unlock, pay per minute	If you get a friend to sign up, you can both get $10 credit.
Flamingo	$1.00	$0.65	Go Passes Allows for up to 45mins riding per day, no unlocking fees. 3-day pass: $8.33 p/d Week pass $4.28 per p/d Month pass: $2.99 p/d	Half price for students, SuperGold card holders and community service card holders ($0.50 to unlock, $0.32 per minute)

Accessing for-hire services can only be done through an app made available through each company. This means that in order to access these services, users need to have:

- a smart phone to be able to download the app;
- regular access to data in order to use the app;
- access to a debit card or credit card and bank account to pay for hiring an e-scooter; and
- enough money to pay for unlocking the app and paying for the length of the trip.

Users also need to live close to or work near where rental e-scooters are docked in order to access them.

Privately owned e-scooters

According to PriceSpy, people can purchase their own e-scooters for anything between $399 to $4,799. Less expensive e-scooters tend to have low power output, lower ranges and are typically designed for children, while the most expensive e-scooters will have features like higher speeds, greater range and attachable tech. Table 10 (below) provides an overview of some of the e-scooters currently on the market, how much they cost, and how much charging time for each of these devices are required. A more detailed overview of all e-scooters currently on the market can be found on pages 18-19.

Unlike people who typically use rental e-scooters, private e-scooter users need to pay the cost for an e-scooter upfront, cover costs related to charging and pay for repairs as they occur. Retailers advise that charging e-scooters is inexpensive, with a 500-watt battery predicted to cost less than 16 cents to charge. Repairs can typically be between $20 -$500 every three years to cover the cost of items such as throttle rubber or replacing an e-scooter's battery.

The costs an e-scooter will be met over its useful life. Several retailers say that users should expect their e-scooters to start deteriorating after around 3 years. However, if owners take care and replace parts, like batteries, the lifespan of an e-scooter can increase to 5 years. While manufacturers are making improvements all the time (records show that e-scooters available for hire only lasted 3 to 8 months when

e-scooters were first introduced in 2018), there is a question around whether it is cost effective to have a transport mode that lasts between 3-5 years when other modes, such as e-bikes, can last up to 10 years, provided it is well cared for.

Table 10: prices and charging time required for e-scooters		
Brand	**Price**	**Charging time needed (Approx)**
Xiamomi Mi Electric scooter 4 pro	$1,298.99	8.5 hours
Segway Kick Scooter Max G30	$1,498.99	6 hours
Mi electric Scooter pro-2	$985.00	8.5 hours
Niu KQi3 Pro	$1,299.00	6 hours
Mi electric Scooter 3 Lite	$698.99	4 hours
Ninebot by Segway Kick Scooter F30	$998.99	5 hours
Ninebot by Segway Kick Scooter GT1	$4,799.00	11 hours

How do these costs compare to other modes? – i.e. walking, cycling, public transport, car use, ferry use

The table below provides an overview of the different monetary costs of taking different modes (based on Wellington prices).

Table 11: monetary costs for users across modes (based on Wellington prices)				
Mode	**Up-front costs (purchase device/car/bike)**	**Travel costs**	**Additional costs – charging, warrants, repairs etc**	**Opportunities for discounts**
Rental e-scooter	$1 to unlock e-scooter	$0.65 cents per minute	None	Friend discounts / 50% prices for students, SuperGold Card holders or community service card holders
Private e-scooter	$399 - $4,799 to buy e-scooter	none	>$1 per charge, replacing parts between $20 - $500 over 3 years)	None
Walking	None	None	None	None
Bike	$300 - $12,240 to buy bike	None	Repairs – up to $250 as needed	None
e-bike	$2,687 - $13,499 to buy e-bike	None	>$1 per charge, repairs ($100 - $150 per year)	None
Rental e-bike	$1 to unlock e-bike	$0.65 cents per minute	None	Friend discounts / 50% prices for students, SuperGold Card holders or community service card holders
Bus (public transport)	Purchase of travel card (snapper) - $10	$1.84 per zone (adult fare)	none	• Under 13-year-olds = free fares • Children = 75% discount on fares • 19- to 24-year-olds = 50% discount on fares • Community Service Card holders = 50% discount on fares • Total mobility/ Blind Low Vision NZ member – 50% discount on fares • SuperGold Card = free off-peak travel

Train	Purchase of travel card (snapper) - $10	Averages $2 - $7 10–30-minute trip (i.e. Wellington to Nae Nae $5.52)	None	• Under 13-year-olds = free fares • Children = 75% discount on fares • 19- to 24-year-olds = 50% discount on fares • Community Service Card holders = 50% discount on fares • Total mobility/ Blind Low Vision NZ member – 50% discount on fares • SuperGold Card = free off-peak travel
Car (petrol)	Average: • $12,000 for second hand • $45,990 for brand new	$0.28 per kilometre	Average: • Petrol = up to $3,000 per year • Maintenance = $1,000 • Insurance = $1,000 • Parking = $500 • Warrants/rego = $300	None

Are there any restraints to taking up riding an e-scooter because of the cost?

Fitt and Curl (2019) noted, in their survey of rental e-scooter users and non-users, that 29% of respondents had not used an e-scooter at the time they were surveyed. Even though the respondent cohort was, on average, younger and wealthier than the population as a whole, nearly 16% of respondents did not have either a bank card or a smartphone or both. These can act as a barrier to accessing micro mobility which requires users to have smartphones, consistent access to data and a bank card. A small number of survey respondents also noted that while they owned smartphones, they struggled to afford data, and for this reason, they were not able to hire an e-scooter for a journey.

How e-scooters are distributed across towns and cities could also be a barrier to uptake. For example, people who live in areas that have limited access to public transport, or where there aren't services like doctors, dentists and supermarkets may not be able to access e-scooters because operators and councils usually arrange for e-scooters to be placed in close proximity to these services.

The Auckland Transport trial report (2019) also noted that: *"the trial area has been focused on some of the more affluent areas of the region, which are also some of the best served by public transport. This has not provided the chance to see how well the scheme would contribute to an increase in travel choice for lower-socio economic areas, and in particular those which have a poorer level of travel choice."*

This shows that there may be an opportunity to improve the effectiveness of e-scooters in terms of filling a gap in transport disadvantage, which has been done in some cities overseas. For example, (Lo et al, 2021) notes that Los Angeles and San Francisco both have licencing requirements to provide a certain level of service to communities that experience transport disadvantage. While it is not clear whether this is carried out in New Zealand, this could be a step taken to reduce barriers to access should the e-scooter declaration be renewed.

Discussion

Rental e-scooters can be a cost-effective way to travel compared to other modes, particularly for short trips.

Privately owned e-scooters offer an alternative option for those who have the ability to pay up front costs for a device and may use this to replace a bike or even a car, particularly for those who live in the city.

However, there are some significant trade-offs with e-scooters related to cost equity. For example, people who don't have access to smartphones, regular data or a bank card cannot benefit from e-scooters and some people cannot afford to use rental e-scooters or purchase their own private e-scooters even though, over time, this might be a less expensive option to running a car.

Purchasing an e-scooter could provide a cost-effective alternative to buying a car, or an e-bike which are much more expensive to purchase (and run in some instances). However, this price range might still be outside the ability of some people to afford.

In addition to this, rental e-scooters are often located in areas that have existing connections – i.e. there are often e-scooters near bus stations, train stations and parks. Those who don't have good access to these amenities, as a result, tend to miss out on any benefits that e-scooters may bring. It is not clear whether any efforts to have been made to try to resolve some of these transport equity concerns. Operators could also look into providing additional supports, for example, providing e-scooters in areas with transport disadvantage or limited access to amenities, or charging users by kilometres, rather than by the amount of time travelled.

User and Non-user Satisfaction

How do users feel about using e-scooters?

People who have used rental e-scooters or own e-scooters, have, in general, supported the continued use of rental e-scooter schemes. For example, an Auckland Transport survey done in 2019 of users found that out of 259 users, 34% supported extended Auckland's e-scooter trial, while 45% supported making the trial permanent.

The growing number of rental e-scooters becoming available, the expansion of share schemes into other regions and the growing number of people purchasing e-scooters also shows that e-scooters provide something positive for users.

However, there have been issues raised about the current power output limit. For example, feedback provided through public consultation on the Accessible Streets Regulatory Package (Accessible Streets) noted that power output is rarely a helpful indicator of safety, speed or size, given that a high-power output does not necessarily translate into high speeds or safety risks. Submitters also noted that the 300W power output limit also poses issues for users who need to travel up hills. Many through this process asked that either the maximum power output be increased, or the requirement to meet power output measurements be removed.

In addition, some users have also called for more e-scooter friendly places to ride (like cycleways) because roads and footpaths are not always the most appropriate places to ride.

How non-users feel about the use of e-scooters?

Non-users of e-scooters can be split into three groups who:

- are largely unbothered by the use of e-scooters,
- strongly oppose the use of e-scooters anywhere, and
- support people using e-scooters, provided they are not used on footpaths.

This third group have concerns because the use of e-scooters on the footpath can stop people from feeling safe – particularly disabled people, older people, and other pedestrians.

This is important because accessibility to public spaces, and how safe people feel in those spaces, directly affects the participation of disabled people in those spaces. If disabled people cannot physically access the transport network or do not feel safe using the transport options closest to them, it makes it harder for them to participate in everyday activities. This can lead to negative impacts on health, wellbeing, and quality of life.

Unfortunately, disabled people report far more difficulty in accessing the transport system in New Zealand than those who are not disabled. Research carried out by Burdett (2017) found people who identify as disabled find that walking is difficult, resulting in less travel, and therefore, less participation in daily activities. Many are unable to access or drive a car, cycle, or find public transport challenging. Walking is seen as a way to travel or as a recreational activity to get out of the house and get active – but if the footpaths or shared paths around their homes feel unsafe, they are less likely to walk.

The NZTA's Customer Journey Monitor survey, conducted in May 2018, found that 23% of the public said there was an occasion in the past week where it would have been beneficial to undertake a journey, but they couldn't. When people with disabilities or long-term health problems who took part in this survey were considered on their own, this figure rose to 50%.

Similarly, a report carried out by Blind Low Vision New Zealand (formerly the Blind Foundation) found that 46% of their clients were reluctant to leave their homes. In many cases, this was because of mobility issues and fears about sharing the footpath with fast users with those mobility issues.

Surveys have reflected this fear of sharing the footpath with e-scooter users. For example, Fitt and Curl (2019) noted that many survey respondents thought that e-scooters travel too quickly to be ideal for use alongside pedestrians but are too slow and too unstable for use on roads alongside faster, heavier vehicles. There is a need for more safe intermediate speed environments, specifically designated for the use of transport modes that are faster than walking but slower and less protected than cars. Such environments might be appropriate for bicycle users as well as for the range of new micro-mobility options becoming available including e-scooters, electric skateboards, wheels, and other new devices.

Auckland Transport (2019) also found that from a sample of the general population, 72% of pedestrians felt unsafe when sharing footpaths with e-scooters. In addition, 35% of people feel that e-scooters sharing with pedestrians on footpaths or other areas is very unsafe (37% say it's a bit unsafe), rising to over 50% when sharing with disabled or elderly pedestrians.

In addition, those who responded to public consultation on Accessible Streets raised concerns about the ability of councils, police or Waka Kotahi to regulate bad behaviour on footpaths, which made fears about using certain footpaths even worse.

Discussion

In general, e-scooter users report enjoying riding e-scooters. Many users noted that more infrastructure should be made available for e-scooters (and cyclists) so that users do not have to compete for space with motorists on the road and pedestrians on the footpath. Increased infrastructure and clearer guidelines for users, would likely have a positive impact on the satisfaction of users, as they will be better equipped to use scooters in a safe and compliant way.

Non-users have raised safety concerns about the use of e-scooter use on the footpath There may be opportunities to help improve safety of e-scooter use on the footpaths, such as better reporting of minor crashes or near misses, improved monitoring or enforcement to target bad behaviour, or education campaigns that help people understand the challenges that riding fast on the footpath can cause for others.

Environmental Impact of e-scooters and contribution to mode shift

How does the use of e-scooters contribute to emissions reduction in NZ?

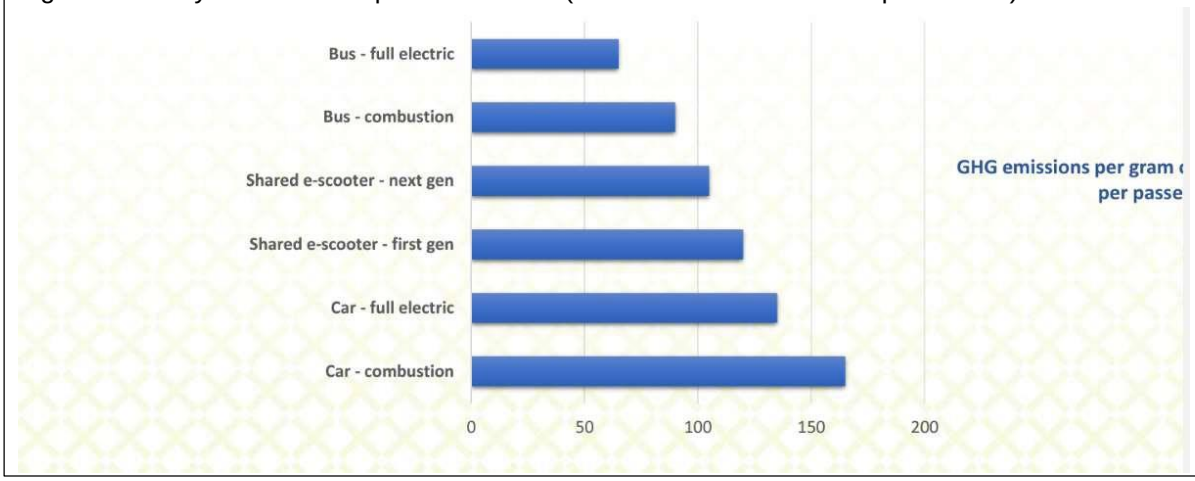
When in use, an e-scooter produces no emissions, meaning that when e-scooter trips replace trips that do contribute to emissions, e-scooters can make a considerable contribution to emissions reduction.

When e-scooter trips replace trips that already produce no emissions (like walking or cycling), the contribution to emissions reduction is neutral.

Government and local government plans such as the Waka Kotahi Cycle Plan and VKT programmes (currently under development) also specifically call out e-scooters as low-emission options that can help move from private vehicles to other options and contribute to our targets in the Emissions Reduction Plan (ERP).

However, emissions do result from the manufacture, charging, and the collection and distribution processes wrapped around rental e-scooters, meaning that emissions can be higher than shared transport modes such as buses. For example, the International Transport Forum (2020) found that the life cycle emissions of a rental e-scooter could be higher than combustion buses (see figure 9 below).

Figure 9: Life-cycle emissions per travel mode (source International Transport Forum)



There are mixed views about overall lifespan of e-scooters. Most online retailers say that users should expect around three years before a scooter will start deteriorating. But if owners take care and regularly repair, the lifespan of an e-scooter can increase to five years.

While the maximum lifespan can be around five years for e-scooters in general, rental e-scooters may have a shorter lifespan. Early reports from overseas (2019) suggesting that rental e-scooters had a life span of about 3 months when share schemes originally became available. This was largely due to multiple rider use as well as user mistreatment of e-scooters. Typically, the lower the lifespan, the higher the manufacturing costs are, which increases life cycle emissions. For example, it was reported that the majority of life cycle emissions of rental e-scooters are generated from materials and manufacturing (about 50 per cent of total life cycle emissions per passenger-mile).

Work is ongoing to extend the lifespan of e-scooters, and some are reporting this progress. For example, Swedish e-scooter hire firm Voi, carried out a study that found that innovations to the fleet had meant the lifespan of e-scooters had gone from 8 months to 4.6 years (with the battery expected to last 3.7 years). This is still a much shorter lifespan than an e-bike, which with regular repairs can last around 10 years.

E-scooter operators who operate in New Zealand are also working to improve the lifespan of their rental e-scooters and limit contribution to emissions and waste. For example, Beam (2023) reports that batteries on their e-scooters currently have a design lifespan of 5 years and the operator is working to improve the lifespan as new technology becomes available. All other operators who engaged with us in this review report current fleets have lifespans of 5 years or more.

New Zealand operators also have a range of interventions in place to support their e-scooters having a lower carbon footprint. For example, Flamingo and Beam work with other organisations to responsibly recycle or resell e-scooters or e-scooter parts that can no longer be used. This includes recycling lithium batteries into new batteries. Flamingo (2022) also reports that the only waste from their e-scooters are small pieces of rubber at their end of their life.

Currently this is no national monitoring of the emissions impact of e-scooters, but the e-scooter operators in New Zealand report that they are making positive strides in this area.

We are not aware of any information about how privately owned e-scooters are recycled or disposed of once they reach the end of their lifespan. It is unclear whether there are systems in New Zealand that support users to get rid of their e-scooter batteries or parts.

Has e-scooter use replaced trips by private motor vehicle or other modes?

Contribution to mode shift from private motor vehicles varies from location to location. For example, in Wellington, it has been reported that 21% of e-scooter trips would have otherwise been made by car.

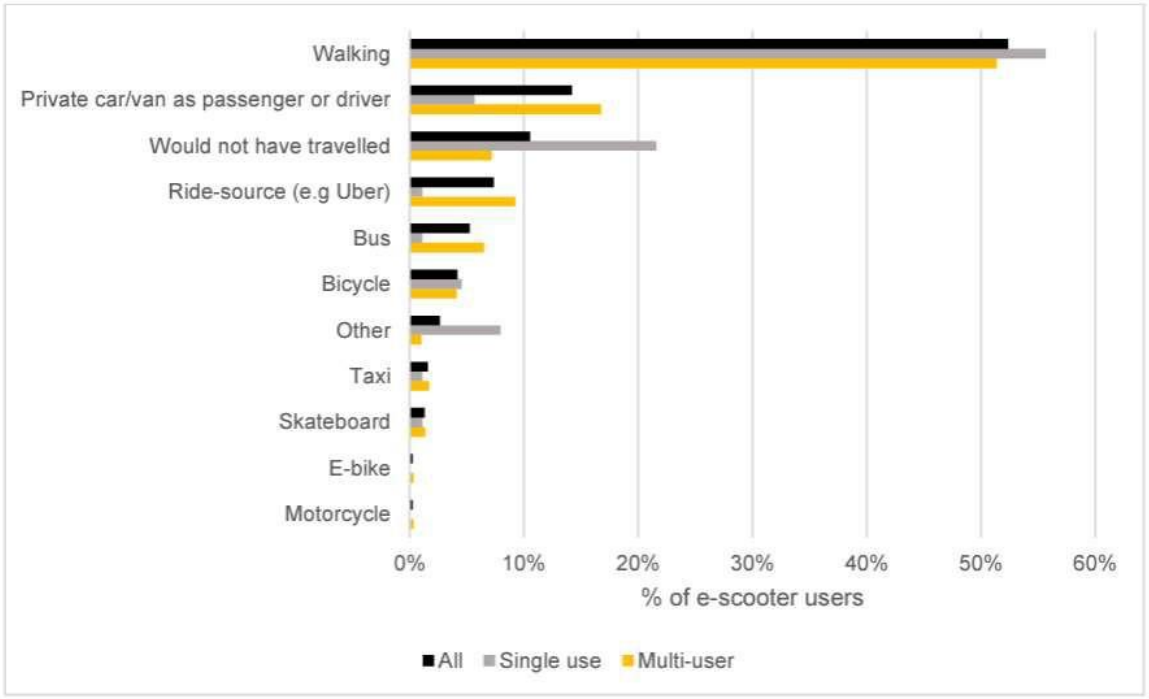
By comparison, the 2019 study by Auckland Transport reported most short trips are made on foot and would be without e-scooters. Almost 50%of rental e-scooter trips are under 1000m (10-12 minutes' walk) and around 18% of trips are under 1500m (15-20 minutes' walk). These are likely to have replaced walking trips rather than use of a motor vehicle. Beyond this distance (the remaining approximately 30% of trips on rented e-scooters) it is more likely that these e-scooter trips are replacing private vehicle trips. Auckland Transport Research also found that survey respondents tended to prefer using rental e-scooters than rental e-bikes because:

- they involve less effort than cycling (at least on flat terrain);
- riders do not have to wear a helmet;
- they are less intimidating than bikes/e-bikes to people that haven't ridden a bike for a while, or ever; and
- there is a safer perceived riding environment for the rider as they are allowed on the footpath.

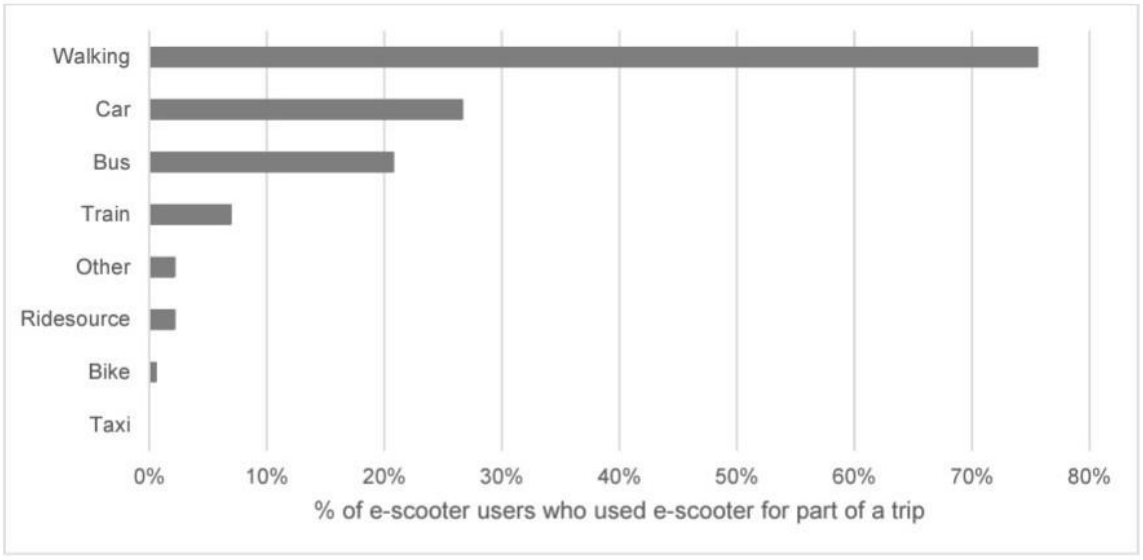
Eight percent of users also claimed that they would not have undertaken their last trip if a rental e-scooter wasn't available.

Fitt and Curl (2021) have noted that the following modes would have been replaced with the use of an e-scooter:

Figure 10: Modes that users would have taken if an e-scooter wasn't available.

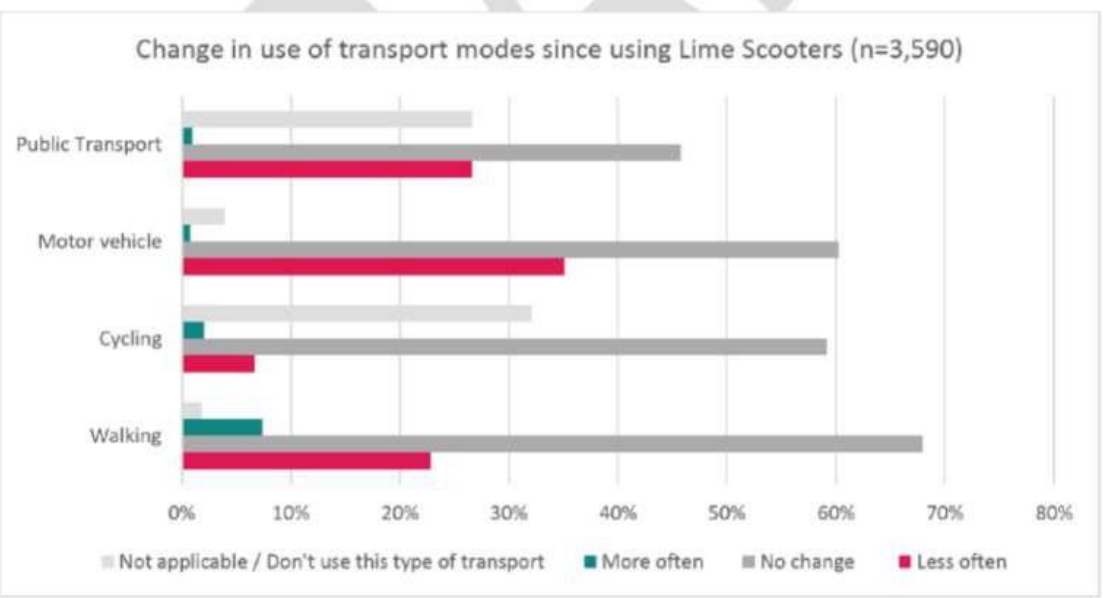


Fitt and Curl (2019) also found that e-scooters are often used to support more sustainable transport options as outlined below:



The 2019 study by Christchurch City Council also found the following changes to the way people travelled in figure 11 below. A survey carried out by Christchurch City Council in 2019 found that most users reported using the e-scooters for fun and recreation (55%), as well as for getting to/from hospitality locations or other social activities (36.7%). 40% of users also reported that they would have walked had the scooters not been available on their most recent trip.

Figure 11: Change in use of transport modes (Christchurch City Council 2019)



Flamingo's (2021) rider survey found that 53% of respondents agreed that Flamingo made it easier for them to forgo owning a personal motor vehicle and over 50% agreed that electric scooter sharing has helped them decrease how often they travel by car or motor vehicle. On their last ride with Flamingo, 29% stated they would have otherwise resorted to using some form of motor vehicle.

Research by Beam (2022) also found that the top 5 reasons given by regular riders for choosing e-scooters over other modes were enjoyability, cost and ease of use compared to other modes of transport, with 36% citing environmental benefits as a key reason for use.

Waka Kotahi research report 674 (2021)[4] predicted trends in technology and shared modes using trip information in strategic transport models. That found a market potential analysis forecast that micro mobility mode share (inclusive of e-bikes) is expected to be between 3% and 11% by 2030 depending on the following 6 factors:

- proximity of routes to 'attractive destinations';
- quality and safety or route infrastructure;
- attractiveness of mode alternatives;
- maturity of network/transport culture;
- amenity and aesthetic value of routes; and
- socio-economic factors.

The growing use of micro mobility in association with public transport could increase patronage in New Zealand by up to 9% by around 2030, but consideration of public transport vehicle and network design is required to enable this.

[4] https://www.nzta.govt.nz/assets/resources/research/reports/674/674-Mode-shift-to-micromobility.pdf

Table 12: Ranges for the likely mode share for e-bikes and e-scooters for end-to end trips for various contexts.

Land-use	Modelled scenarios	Mode share range
Major city – CBD	• High uptake scenario for e-scooters • Medium uptake scenario for e-bikes	• E-scooter mode share: 1.6%–5.7% of all trips • E-bike mode share: 4.9%–5.1% of all trips
Major city – fringe (–5 km radius)	• Medium uptake scenario for e-scooters • High uptake scenario for e-bikes	• E-scooter mode share: 1.0%–3.4% of all trips • E-bike mode share: 7.7%–8.1% of all trips
Major city – suburban	• Medium uptake scenario for e-scooters • Medium uptake scenario for e-bikes	• E-scooter mode share: 1.0%–3.4% of all trips • E-bike mode share: 4.9%–5.1% of all trips
Regional city – CBD/fringe	• Medium uptake scenario for e-scooters • Medium uptake scenario for e-bikes	• E-scooter mode share: 1.0%–3.4% of all trips • E-bike mode share: 4.9%–5.1% of all trips
Regional city – suburban	• Low uptake scenario for e-scooters • Low uptake scenario for e-bikes	• E-scooter mode share: 0.3%–1.2% of all trips • E-bike mode share: 1.8%–2.0% of all trips

Discussion

E-scooters are generally an effective form of transport to support New Zealand's emission reduction goals. When being used to replace trips that would typically be taken via car or bus, they are typically contributing to emissions reduction as they produce no emissions while in use.

While there are potentially substantial emissions reductions benefits coming from e-scooters, further information is needed in order to directly quantify these benefits. E-scooters may be replacing active mode trips such as walking or cycling, so the potential emission reductions of e-scooters in these situations is negligible. Obtaining accurate data on the type of mode shift e-scooters are enabling may be required to further illustrate the VKT and emission reductions benefits of e-scooters. Accurate information regarding the lifespan of rental and private e-scooters may also be crucial to indicate the emissions reduction potential of e-scooters over their lifespan, relative to the emissions cost of production.

Bibliography

- Abley (2021) Micromobility Risk Study: Auckland Transport.
- Attwood, J. (2022) Rental e-scooters have lifespan of nearly five years, says report. Move Electric
- Auckland Council (2019) Rental e-scooter trail 20.0, Results, evaluation, and recommendations.
- Badia, H. Jenelius, E. (2023) Shared e-scooter micromobility: review of use patterns, perceptions and environmental impacts. Transport Reviews.
- Beam (2022) New research by Beam reveals shared e-scooter use in Auckland has hit mainstream levels
- Bekhit, M.N.Z, Le Fevre, J. and Bergin, C.J. (2020) Regional healthcare costs and burden of injuries associated with electric scooters. Injury.
- Christchurch City Council (2019) Report from Infrastructure, Transport and Environment Committee – 13 February 2019.
- Dobson, G. (2020) E-bikes and e-scooters close to exceeding new car sales. EVs & Beyond.
- Downard-Wilke, A (2020) Predicting electric micro-mobility sales in NZ, ViaStrada
- EY (2020) Micromobility: Moving cities into a sustainable future.
- Fitt, H., & Curl, A. (2019). E-scooter use in New Zealand: Insights around some frequently asked questions.
- International Transport Forum (2020) Safe Micromobility
- Ishaq, M. Ishaq, H. and Nawaz, A. (2022) Life Cycle of electric scooters for mobility services: A green mobility solution. International Journal of Energy Research.
- Kirkness, L. (2020) Online data shows Kiwis are opting for e-scooters over e-bikes as a means to get around. NZ Herald
- Laubscher, L. (2021) Micromobility: e-bikes and e-scooters charge ahead. Genesis Climate Hub.

- Lo, D. Mintrom, C. Robinson, K. and Thomas, R. (2020) The impact of Regulations on the Usage of e-scooter Sharing Systems in New Zealand Cities. Department of Geography, University of Canterbury.
- Mathias Shanti (May 2023) Transport saviour or ‘death machine’? The state of the e-scooter in Aotearoa. The Spin Off
- McGuiness, M.J. Tiong, Y. and Bhagvan, S. (2021) Shared electric scooter injuries at Auckland City Hospital: a comparative review on year after their introduction. New Zealand Medical Journal.
- Perry, F. (2020) How sustainable are electric scooters? RNZ (taken from BBC Future). https://www.rnz.co.nz/news/world/418988/how-sustainable-are-electric-scooters
- Pyzyk, K. (2019) Reduce, reuse, rescoot? A look at e-scooters’ long-term sustainability. Smart Cities Depp Dive.
- Reck, D.J. Haitao, H. Guidon, S. and Axhausen K.W. (2021) Explaining shared micromobility usage, competition, and mode choice by modelling empirical data from Zurich, Switzerland. Transportation Research Part C: Emerging Technologies.
- Ride Report (2023) Auckland Micromobility Dashboard
- Ride Report (2023) Christchurch Micromobility Dashboard
- Ride Report (2023) Dunedin Micromobility Dashboard
- Ride Report (2023) Hamilton Micromobility Dashboard
- Ride Report (2023) Napier Micromobility Dashboard
- Ride Report (2023) New Zealand Micromobility Dashboard
- Ride Report (2023) Palmerston North Micromobility Dashboard
- Ride Report (2023) Porirua Micromobility Dashboard
- Ride Report (2023) Selwyn Micromobility Dashboard
- Ride Report (2023) Taupo Micromobility Dashboard
- Ride Report (2023) Tauranga Micromobility Dashboard
- Ride Report (2023) Waimakariri Micromobility Dashboard
- Ride Report (2023) Whanganui Micromobility Dashboard
- Ride Report (2023) Wellington Micromobility Dashboard

- Ride Report (2023) Whanganui Micromobility Dashboard
- Ride Report (2023) Whangarei Micromobility Dashboard
- Scoop/PriceSpy (2020) PriceSpy Reveals Popularity for Electric Scooters is Riding High Above Electric Bikes.
- ViaStrada (2022) Speed Surveys of powered transport devices.
- Waka Kotahi and ViaStrada (2022) Cycle parking planning and design: Cycling Network Guidance technical note.
- Waka Kotahi (2019) Keeping Cities Moving
- Waka Kotahi (2021) Mode Shift to Micromobility – research report 674, Beca Ltd,
- Walter, R. (2022) How long does an electric scooter last? Expectations vs reality. Electric ride lab
- Wang, K. Qian, X, Fitch, D.T. Lee, Y. Malik, J. and Circella, G. (2022) What travel modes do e-scooters displace? A review of recent research findings. Transport Reviews.