Managing the electric bike and scooter revolution

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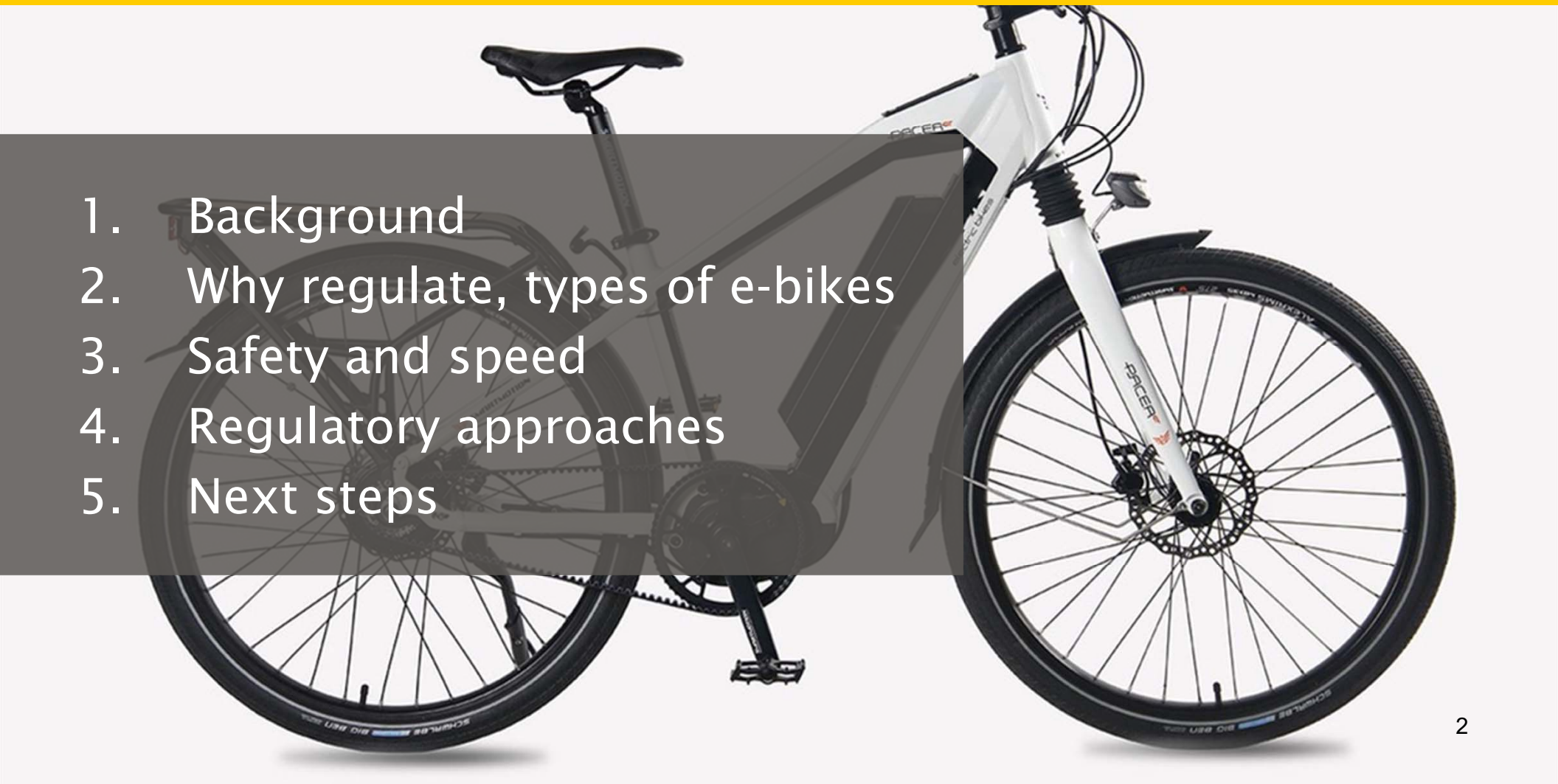
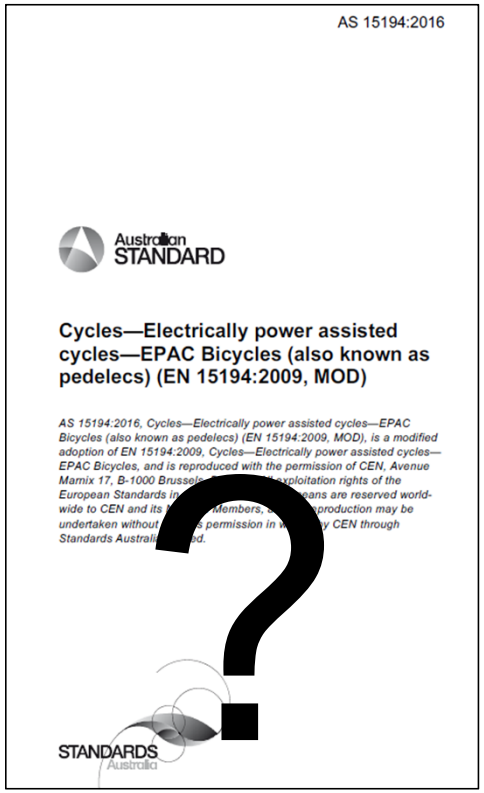
TRANSPORT PLANNING AND DESIGN

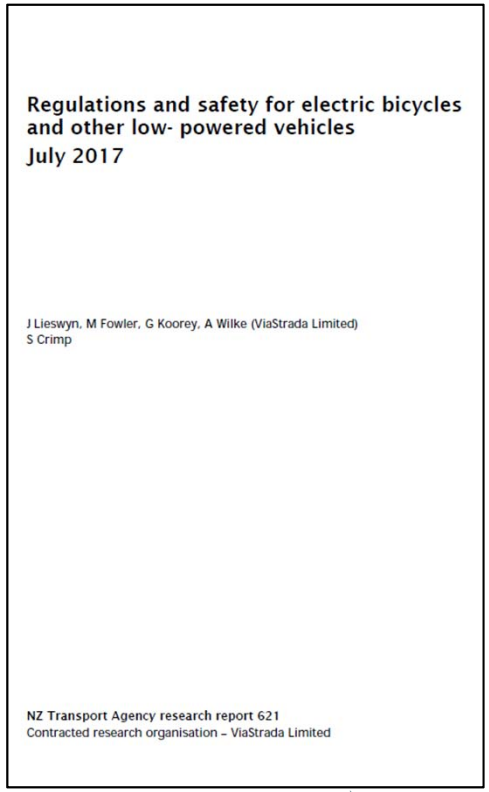
Presentation outline



1. Background
2. Why regulate, types of e-bikes
3. Safety and speed
4. Regulatory approaches
5. Next steps

Background





2014 2016 2017

https://www.nzta.govt.nz/assets/Uploads/Progress-on-making-cycling-safer-and-more-attractive.pdf

A note to the audience

This presentation is based on research report *RR 621 Regulations and safety for electric vehicles and other low-powered vehicles*.

While the NZ Transport Agency provided investment, the research was undertaken independently, and the resulting findings should **not be regarded as being the opinion, responsibility or policy** of the Transport Agency or indeed of any NZ Government agency.

The Transport Agency is established under the Land Transport Management Act 2003. The objective of the Transport Agency is to undertake its functions in a way that contributes to an efficient, effective and safe land transport system in the public interest. The Transport Agency funds innovative and relevant research that contributes to this objective.

People using this research should apply and rely on their own skill and judgement and, if necessary, they should seek appropriate legal or other expertise regarding its use.

Research motivation

- Innovation outrunning legislation

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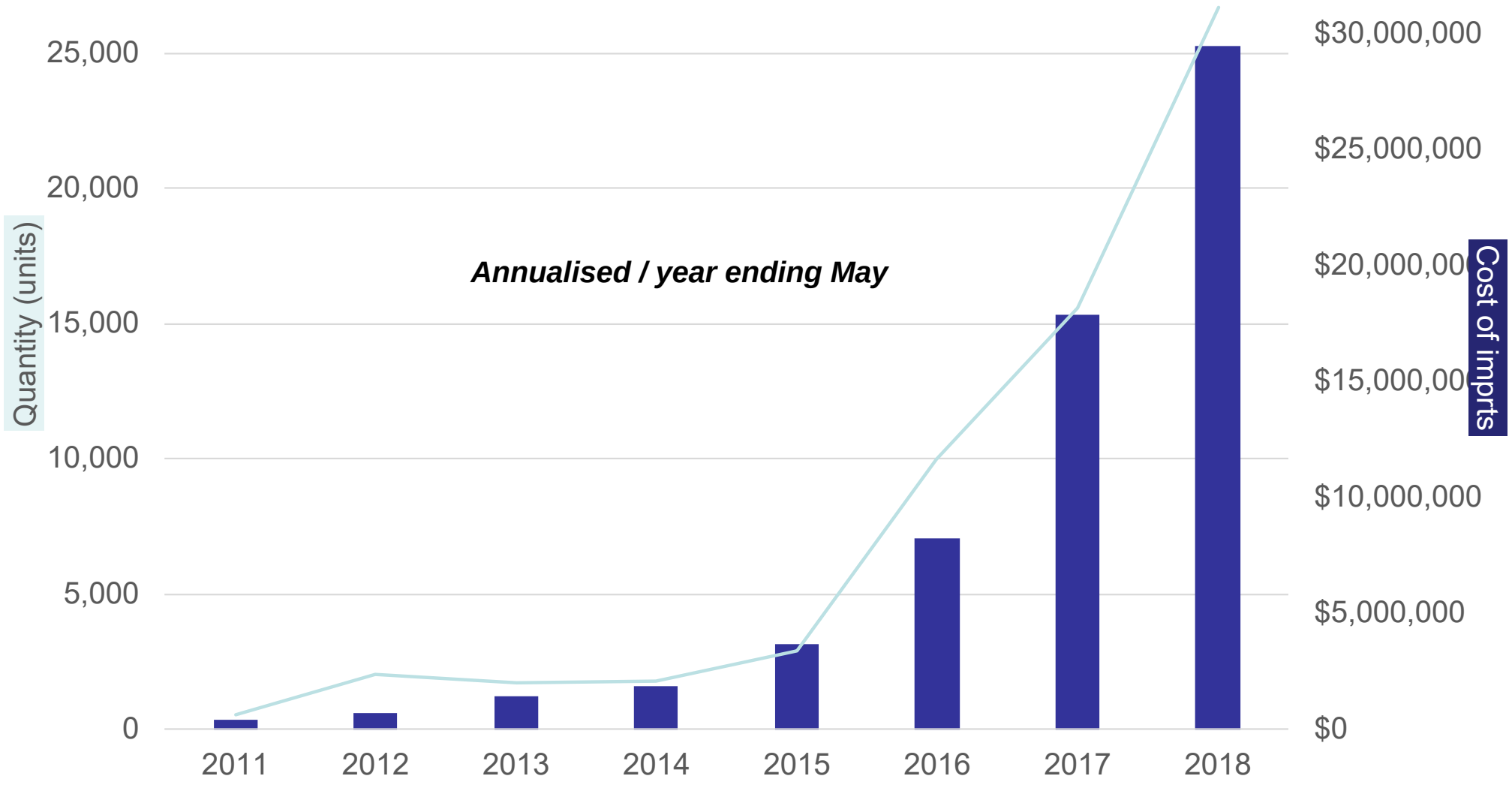
Estimated imports of e-bikes



WHY REGULATE | TYPES OF E-BIKES

Why: clarify existing rules

wheeled recreational device—

a) means a vehicle that is a wheeled conveyance (other than a cycle that has a wheel diameter exceeding 355 mm) and that is propelled by human power or gravity; and

b) includes a conveyance to which are attached 1 or more auxiliary propulsion motors that have a combined maximum power output not exceeding 300 W

?

The following are examples of vehicles that meet the definition of motor vehicle but have difficulties meeting the safety standards and other requirements. This means they cannot be operated on the road.

- Motorised skate boards, scooters, and roller skates
- Segways and similar
- Powered Self Balancing Unicycles
- Cycles fitted with petrol motors
- Low powered scooters/mopeds
- Cycles designed primarily to be propelled by an engine not the muscular energy of the rider

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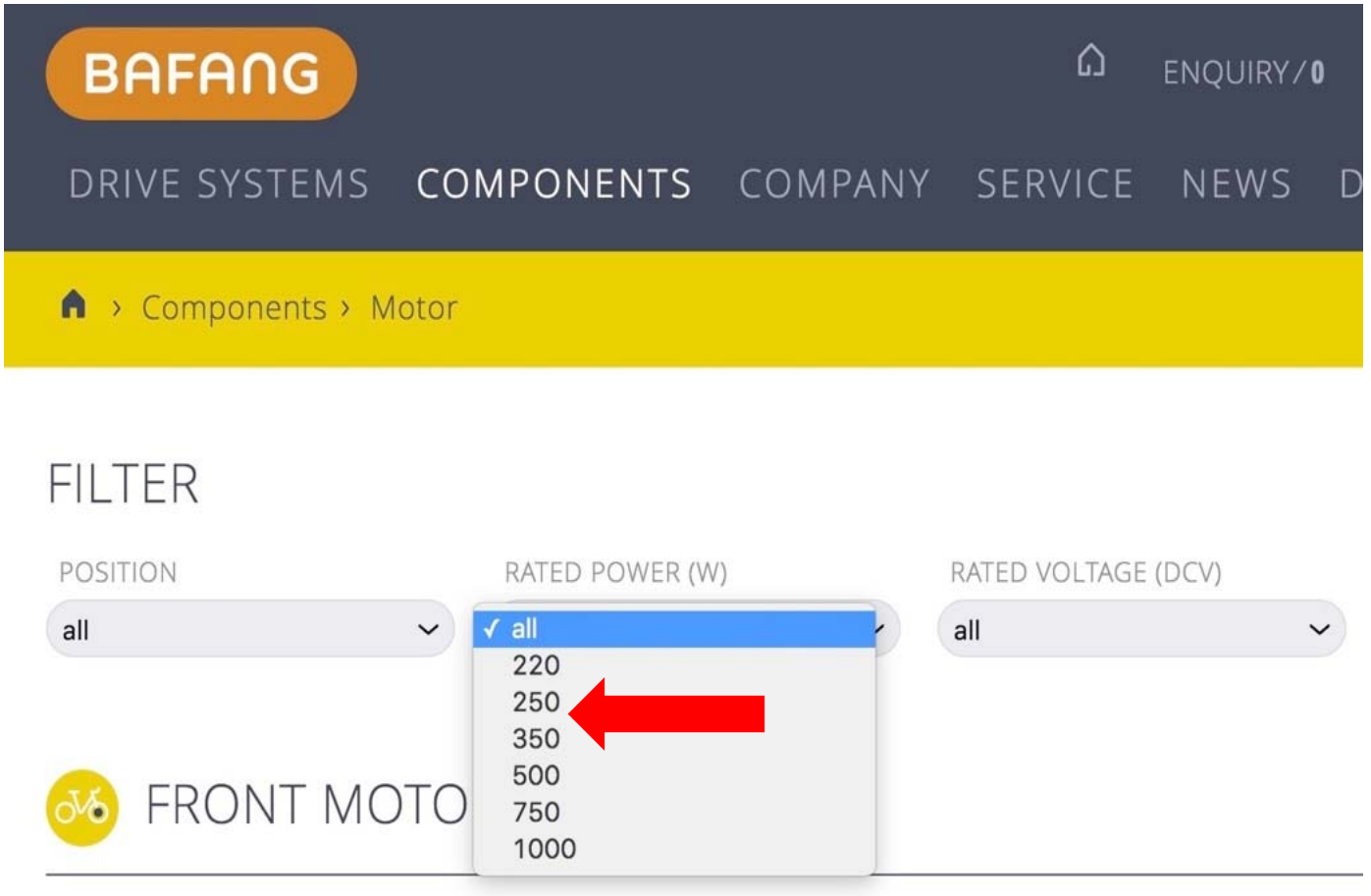
Why: conform to, support industry

- 300W rated motor doesn't exist



http://www.szbaf.com/en/components/motor.html

Safe system approach – vehicles

ABC News Philadelphia

Safe system approach – vehicles

Safe system approach – facility design

LTA, Singapore

Safe system approach - users

E-bike types in NZ (per current regulations)

"Power-assisted pedal cycle"
designed primarily to be propelled by the muscular energy of the rider

Pedelec

Throttle
'twist & go'

"Power-assisted pedal cycle"
Utility bike. Ambiguous term. Not ergonomic to pedal – is it an SSEB?

"Power-assisted pedal cycle"
Trail bike with a throttle

"Pedal-assisted power cycle"
term in case law only. Scooter-style electric bike (SSEB). Max 20-25 km/h. Looks like a motor scooter.

"Power-assisted pedal cycle"
Cargo trike

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SAFETY AND SPEED

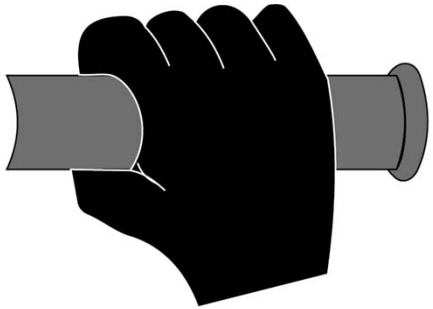
Throttles

PROS

- Confidence for impaired or less fit
- Easier hill starts
- No take-off lag

CONS

- Reduced health benefit
- Reduced range
- Take-off surprise
- More controls / confusion
- Less ‘natural’ feeling



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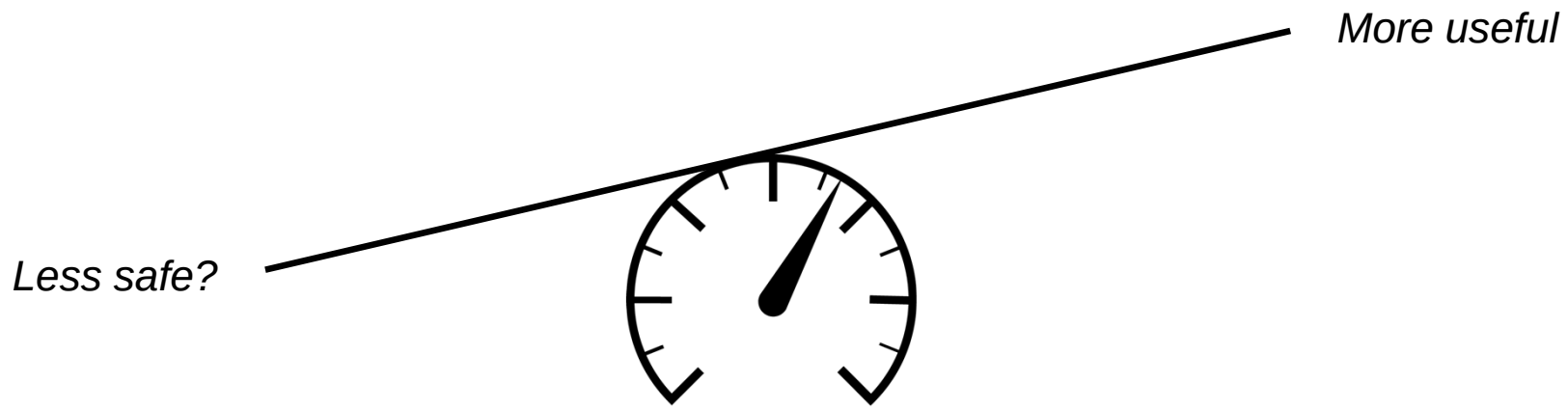
Speed is most common safety concern

- E-bikes, compared with ordinary bikes:
  - Heavier
  - Can accelerate faster
  - Higher average speed
  - Can take drivers by surprise

  → Greater momentum on collision
  → Requires greater cognitive ability
  → Helps users to avoid conflict, take the lane
  → Throttles can help impaired users



Methods

- Pro Laser III radar gun
  - Speed accuracy +/-1 km/h for subject targets
  - Range 1800m, accuracy 0.15m
  - Acquisition time 0.3s
  - Beam width 1m @ 300m
- Free speed observations – separate reading if:
  - Lateral ± 1m, considered apparent steering inputs
  - Longitudinal ± 3 bike lengths, considered apparent deceleration
- E-bikes identification
  - Initial judgement aided by presence of steady headlight
  - Confirmed by visual scan for motor

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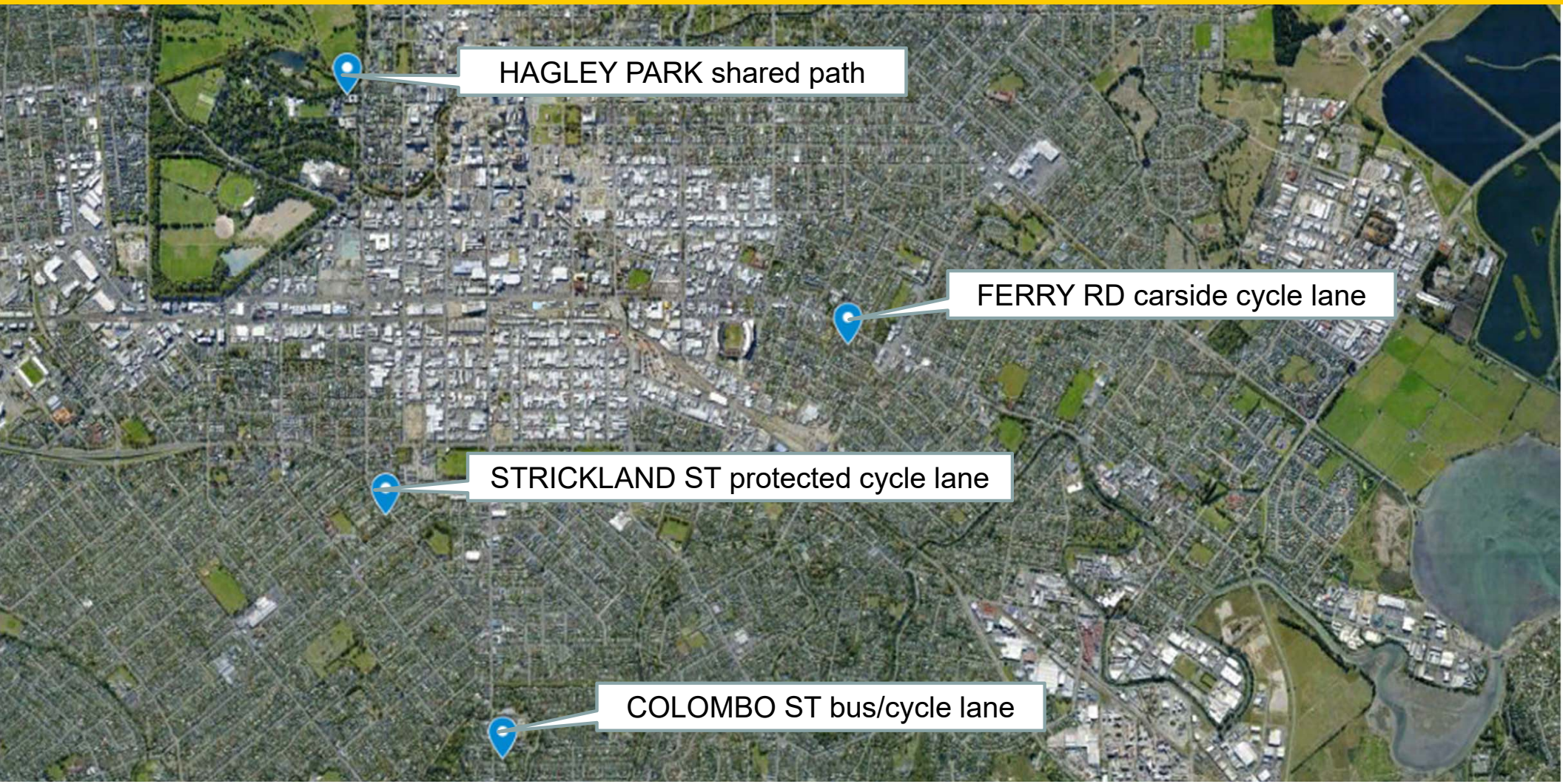
Christchurch sites



Strickland Street cycleway - 2017

Strickland Street cycleway

Results by gender (2018)

Type	Female		Male		Diff.	All riders		Precision at 95% CI
	Avg.	Obs.	Avg.	Obs.	Avg.	Avg.	Obs.	
E-bike	27.4	9	28.0	17	0.6	27.8	26	1.8 km/h
Unassisted	20.8	174	24.0	387	3.2	23.0	561	0.4 km/h
Female % (e-bike)		35%						
Female % (unassisted)		31%						
E-bike diff.						4.8		

1. Women are a larger proportion of e-bike (35%) than unassisted riders (31%)
2. The difference in average speed between genders **may** be less for e-bikes than for unassisted riders
3. E-bike riders travel **about** 5 km/h faster (29.6 km/h) than unassisted riders (24.4 km/h)

Results by facility type

Type	Bus / bike lane		Cycle lane carside		Shared path		Protected	
Location	Average	Obs.	Average	Obs.	Average	Obs.	Average	Obs.
E-bike								
Colombo	27.3	4						
Ferry			29.0	1				
Hagley					28.5	14		
Strickland							26.6	7
Unassisted								
Colombo	24.9	135						
Ferry			23.0	50				
Hagley					21.6	222		
Strickland							23.3	154
Total	24.9	139	23.1	51	22.0	236		
E-bike diff.	2.4		6.0		**6.9**		**3.3**	
2017 diff	0.4		7.9		**5.0**		n/a	n/a

Summary of Christchurch speed study

- E-bikes went from 2.6% to 4.4% of total bikes counted from 2017 to 2018
- Speed difference holding around 5 km/h
  - Higher difference on shared path than on protected cycleway
- Higher proportion of women on e-bikes than unassisted bikes
- More mid-drives and cargo bikes
- Need larger sample and more cities

	Autumn 2017	Winter 2018
e-bikes	15	26
unpowered	557	561
% e-bikes	2.6%	4.4%
Female % (e-bike)	38%	35%
Female % (all bikes)	25%	31%
E-bike vs. unpowered diff.	5.3	4.8

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REGULATORY APPROACHES

Regulation in EU

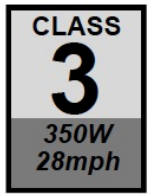
- Effective 01 January 2017

	Category	Description	Power	Motor cut-out	Type approval
AS 15194	Pedelec	Motor only functions on condition the cyclist pedals.	<= 250 W	<= 25 km/h	Not applicable
	Powered cycle	Designed to pedal; auxilliary motor with primary aim to aid pedalling. May have a throttle. Can include vehicles with 2, 3 or 4 wheels.	<= 1000 W	<= 25 km/h	L1e-A
	Moped	Includes SSEBs, electric mopeds and S-Pedelecs.	<= 4000 W	<= 45 km/h	L1e-B

Regulation in USA

Class	Description	Throttle	Power	Motor cut-out	Age
Class 1	Low-speed **pedal**-assisted electric bicycle	No	Max 750W	Max 20 mph (32 km/h)	n/a
Class 2	Low-speed **throttle**-assisted electric bicycle	Yes			
Class 3	**Speed** pedal-assisted electric bicycle Helmet, speedometer, **prohibited on shared paths or protected cycleways unless authorised locally**	No		<= 45 km/h	>= 16

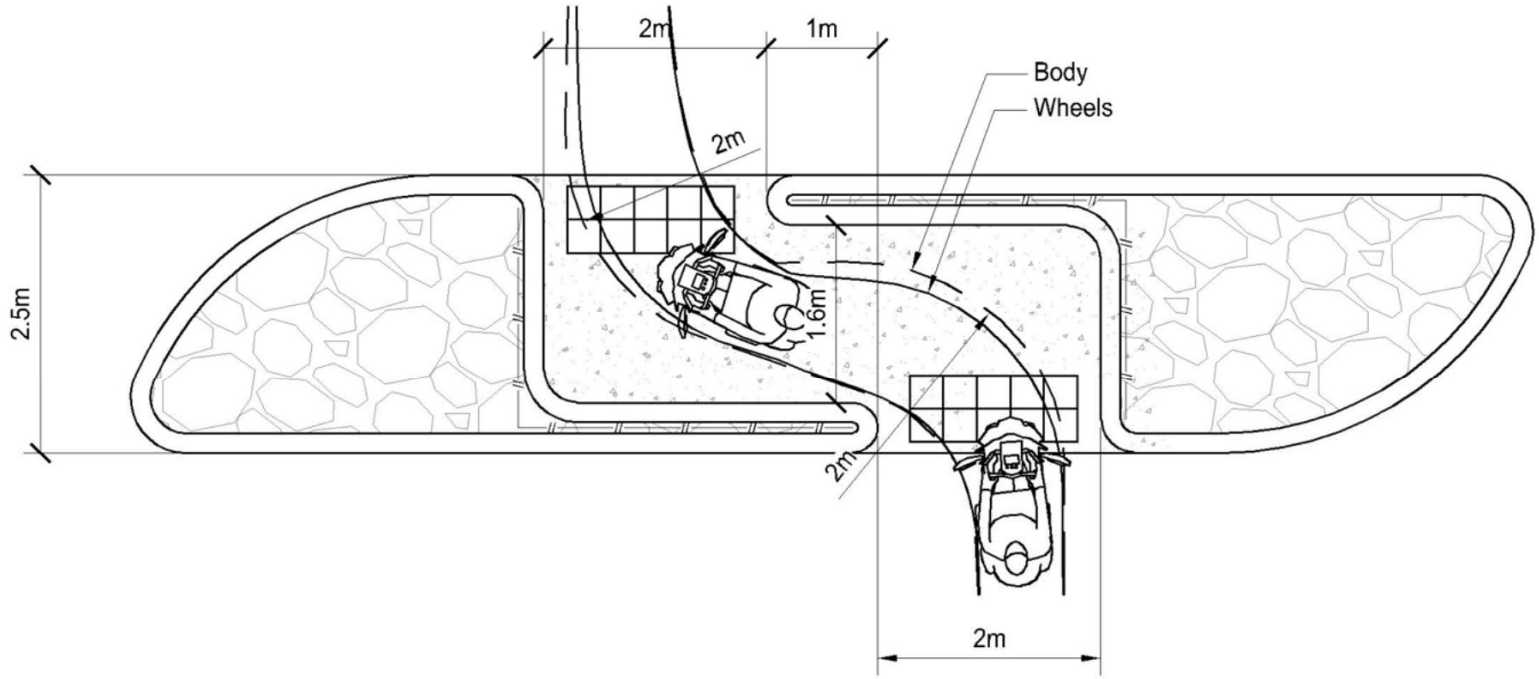
- Tampering with speed control prohibited
- Registration, license, insurance not required
- Permanent label
- Mopeds, SSEBs separately regulated



Mobility scooter geometric requirements

A practical interpretation of NZS 4121:2001 with respect to mobility scooters

March 2018



PALMERSTON NORTH CITY COUNCIL

Figure 3 turning path through median refuge with chicane

SITUATION TODAY AND NEXT STEPS

Situation today

Sale >300W not illegal

Use of >300W on road is illegal

Industry competitive concerns

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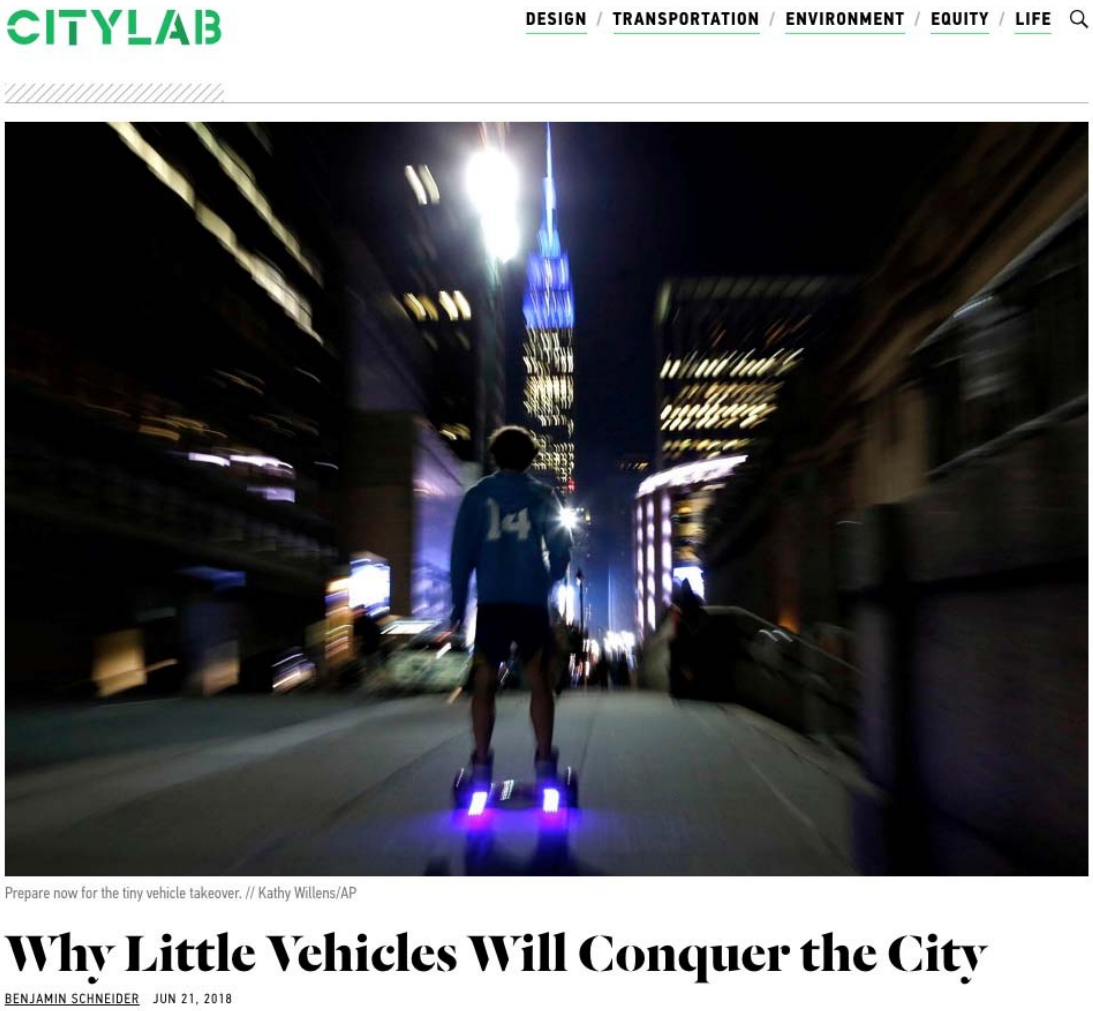
E-scooters and mobility as a service

- Self-balancing variants easy to ride slowly
- Faster than most other modes for short trips
- Can carry on the bus or into an elevator
- Scooter sharing on the horizon?



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LimeBike
Lime


ELECTRIC BIKE
ELECTRIC SCOOTER
RENTAL & SALE
ELECTRIC BIKE RENTAL
ALL DAY $75
HALF DAY $45
ELECTRIC SCOOTER RENTAL
ELECTRIC SCOOTER RENTAL
4 HOURS $35
ELECTRIC SKATEBOARDS
HOVER BOARDS
ELECTRIC SCOOTER SALES
TRAM
Combo Tickets
itag

Use of electronic scooters to be considered as more hit the pavement - 'they can do a lot of damage'

Ongoing concerns about shared paths

Where narrow paths cannot be avoided; aim for separation and better LOS as budget and priorities allow

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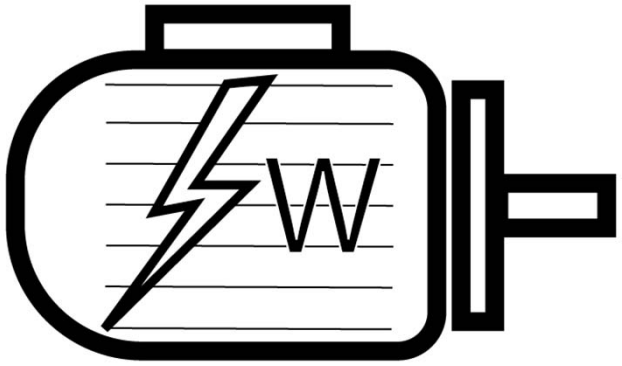
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Thank you

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