## Inquiry into e-mobility safety and use in Queensland

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## SUBJECT: Inquiry into e-mobility safety and use in Queensland

Dear committee members,

Thank you for the inquiry and the opportunity to provide this submission.

I am a sustainable transport researcher who has spent the last nineteen years teaching and researching in transport at Griffith University. My small transport research team and I were previously commissioned by state and local governments to review e-bike and e-scooter regulations. This includes work for Brisbane City Council on e-scooter regulation, and work for the QLD Department of Transport and Main Roads on the regulated dimensions and weight of e-scooters. We also previously received research funding from Neuron and Beam, two of the e-bike and e-scooter hire companies, to explore e-mobility and tourism travel.

The views expressed in this submission are my views as a researcher only and do not represent the views of Griffith University or any other organisation or institution.

### 1. Benefits of e-mobility

1.1. **Tourism and Economic Benefits –** Our previous research on the benefits of cycling, e-bikes and e-scooters includes three separate studies of:

- restaurant/café spending by transport mode of arrival in West End, Caxton Street and the Riverside precincts in Brisbane[1];
- restaurant/café and retail spending by transport mode of arrival for businesses in Elizabeth and Edward Streets in Brisbane City adjacent to Brisbane City Council's *CityLink* protected bicycle lanes[2];
- tourism travel and spending behaviour by tourists using Neuron e-scooters in Townsville[3].

In summary, we consistently found that business owners/managers have a very poor understanding of the relative importance of car parking and car arrivals to their businesses in these urban environments. We found in Brisbane and its café strips that business owners/managers perceived that more people arrived at their business by car than reality. They also erroneously perceived that car drivers and passengers spent more per head than they did. The business owners/managers consistently underestimated the proportion of customers arriving by bicycle/e-bike/e-scooter, and by public transport, and the large spending of these sustainable transport customers[2,3]. The worst mis-match between owner/manager perceptions and the travel behaviour of their actual customers was seen in the retailers in Edward and Elizabeth Streets in the survey undertaken for Brisbane City Council on the CityLink cycleways. In that study, the best predictor variable for whether an owner/manager had a pro-car bias was if they themselves drove to work. If the owner/manager mostly drove to work, they thought more of the store spending came via car. These mis-matches in perception and reality reflect the broader pro-car bias of the business community in Australia. Similar effects have been seen in similar studies in South Melbourne, Victoria, and in Perth, WA, as well as in the UK and North America. The academic community terms this car-bias 'motor vehicle normativity', which has been abbreviated to 'motornormativity'[4], though some advocates prefer the term 'car-brain'.

Our research in Townsville[3] also showed that the tourists who used Neuron e-scooters, and used them more for their travel within the city, spent more on tourism expenditures per day. That study also found some limited evidence from the movements and stopping patterns of the de-identified travel maps of these tourists that they were also exploring further and stopping and spending money in local 'mum and dad' businesses and cafes, rather than just travelling to the same set of well patronised central tourism businesses in Townsville, such as the casino. In a finding at odds with popular perceptions, we also found a significant proportion of these tourist Neuron e-scooter users were seniors – Baby Boomers on e-scooters.

In sum, our research has contributed to a broader set of studies abroad and interstate that has revealed direct tourism and economic benefits from investment in cycling/scooter infrastructure and in the provision of public e-mobility hire schemes. These investments are helping with the local visitor economy, and in tourist/visitor dispersal across the city.

1.2. **Space efficiency** – e-bikes and e-scooters take very little roadspace compared to Queensland's car fleet. The last time we checked (approx. 2020) the average SEQ car trip

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[1] See https://australasiantransportresearchforum.org.au/do-restaurant-precincts-need-more-parking-differences-in-business-perceptions-and-customer-travel-behaviour-in-brisbane-queensland-australia/

[2] See https://australasiantransportresearchforum.org.au/should-we-have-pop-up-bikeways-insights-from-brisbanes-citylink-cycleway-trial/

[3] See https://theconversation.com/wallets-on-wheels-city-visitors-who-use-e-scooters-more-spend-more-161886

[4] Walker, Ian, and Marco te Brömmelstroet. "Why do cars get a free ride? The social-ecological roots of motonormativity." *Global Environmental Change* 91 (2025): 102980.

has only 1.1 persons in the vehicle according to TMR's *South East Queensland Household Travel Survey* (SEQTS) data. Queenslanders share their cars less than almost any other population on earth. E-bikes and e-scooters also take up very little space for storage, compared to conventional car parking. The thousands of cyclists, e-bike riders and e-scooter riders travelling to and through the Brisbane central business district each day are generally the least-subsidised travellers (aside from pedestrians). Public transport is highly subsidised, especially under 50c fares; motor vehicle use is subsidised via various tax subsidies, road infrastructure and car parking development and maintenance costs, and more. If we are serious about congestion-busting in urban areas then cycling, e-bikes and e-scooters are an important 'solution'.

1.3. **Equity effects** – these modes provide very low-cost, door-to-door transportation. E-bikes and e-scooters are ideally suited to the distances of many Queenslander's trips, especially the majority of trips, which are less than 5km in length, and also for longer journeys when used in combination with public transportation. Up-front purchase costs are significantly less than motor vehicles.

Tertiary students are a key user group of e-mobility, with young adults obtaining their drivers licences later than previous generations and struggling with both accommodation and transport costs during the cost-of-living crisis. Many of our Griffith students use e-bikes and e-scooters as part of both their commuting and non-university travel, partly to save on the costs of car ownership and use. As we have regularly improved our end-of-trip facilities (i.e. recent investments in bike cages at Southbank, and in significant expansion of bicycle parking at the Gold Coast Campus) the university has seen strong increases in ridership. Griffith joined UQ in offering the *ODIN-Pass* mobility-as-a-service scheme to Gold Coast campus students, encouraging them to purchase combined subscriptions for Lime e-bike and public transport use, amongst other offerings.

1.4. **Environmental benefits** – e-bikes and e-scooters have zero local air emissions and negligible noise emissions. Compared to internal combustion engine motor vehicles and motorbikes (ICEs) the e-mobility modes offer quiet, cheap and sustainable transportation. The energy required to recharge an e-bike is significantly less than an electric motor vehicle. I have estimated the cost of recharging my 99 Bikes' *PEDAL* brand e-bike from the local grid at ~AUD$1.12, which provides three days commuting a few km each way to/from the university. E-bikes and e-scooters are also far more efficient at moving humans than other individual modes of transport. In regional Chinese cities where 30km/h speed limited e-bikes and mopeds often provide more than 20% of all trips, and where car fleets are increasingly electrified, the street environment is significantly quieter than in Australian cities, offering major physical and mental health benefits to human health. E-bikes use less than one-twelfth of the electricity used to propel a small electric hatchback. E-bikes and e-scooters have negligible impact on Queensland's electricity grid, unlike the coming transition of the car fleets to electric vehicles.

## 2. Safety issues associated with e-mobility use

2.1. There is significant concern about road trauma relating to all active transport modes in Queensland, including e-bikes and e-scooters. The rates of road trauma are high, especially if considered in terms of exposure (how many injuries/deaths per km ridden by bicycle or e-bike/e-scooter).

2.2. For e-scooters: In our report for the Department of Transport and Main Roads on e-scooter dimensions, which the department should be able to provide, we made recommendations to:

- make minor increases to the maximum length and to the maximum width of e-scooters to allow for the added safety features that e-scooter now include and allow for larger front wheel sizes;
- adopt a minimum front wheel size to decrease the risk of the most dangerous head-ground crashes (in Australian vernacular: 'face-plants') that are over-represented in e-scooter crashes due to the rider's position.[5]

2.3. For e-bikes: one might assume heavier e-bikes may create more risk for injury to the rider in a crash. However, the emerging literature does not suggest this is the case.

- In a recent Dutch study[6], where e-bikes are mostly Class 1 pedelecs that equates to Queensland's legal e-bike fleet, researchers found no meaningful difference in trauma severity between adult (16+ year old) e-bike riders and adult conventional bicycle riders presenting at hospitals. [They did note that alcohol intoxication was higher in conventional bike riders though].

- A just-released study from North America[7] shows that e-bike and e-scooter rides are more likely to be treated and released at hospitals than conventional bike riders who are kept for observation and treatment more often, even when accounting for the higher numbers of men riding conventional bikes. More conventional bike crashes involved motor vehicles than e-bike or e-scooter crashes. More e-scooter crashes likely hit an obstacle or just 'fell off'.

2.4. The type of e-bikes/e-scooters one encourages on the road matters, as do the street environments provided to them. China's road trauma rates are of interest. China has encouraged the use of a particular form of e-bikes (mostly 30km/h limited low-powered throttle e-mopeds) which have mode shares above 15% of all trips in many cities. Whilst China has very high total road injuries and deaths, the road trauma rate per rider-km for powered two-wheelers compares very favourably with those of the 'petrol motorcycle' countries such as Vietnam, Thailand and Indonesia, where petrol motorbikes dominate road use. They also compare relatively well with bicycle trauma in other developing nations. China strongly discourages petrol motorbikes and has encouraged low-speed and relatively low-powered e-mopeds. They can't be used for stunts such as 'wheelies' like Australia's throttle fat-tyre e-bikes. Speeds are rigorously enforced in China's cities. Key is that they've also built the world's largest urban networks of protected on-road bicycle lanes (with barriers to entry by cars). They also have lower posted street speeds for motor vehicles in local streets compared to Australia. This combination produces relatively low road deaths for powered two-wheelers per rider-km, despite a litany of challenges familiar to Australia, such as helmet

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[5] See: Chontos, Rafael, et al. "A Numerical Investigation of Rider Injury Risks During Falls Caused by E-Scooter–Stopper Impacts." *Journal of biomechanical engineering* 145.10 (2023): 101006; and, Posirisuk, Pasinee, Claire Baker, and Mazdak Ghajari. "Computational prediction of head-ground impact kinematics in e-scooter falls." *Accident Analysis & Prevention* 167 (2022): 106567.

[6] Verstappen, E.M.J., Vy, D.T., Janzing, H.M. *et al.* Bicycle-related injuries in the emergency department: a comparison between E-bikes and conventional bicycles: a prospective observational study. *Euro Jl of Trauma & Emerg Surgery* **47**, 1853–1860 (2021). https://doi.org/10.1007/s00068-020-01366-5

[7] Hannah Younes. Comparing injuries from e-scooters, e-bikes, and bicycles in the United States, *Journal of Cycling and Micromobility Research*, Volume 4, 2025, 100061, ISSN 2950-1059, https://www.sciencedirect.com/science/article/pii/S2950105925000051

wearing and young rider behaviour[8]. Critical to China's success is the proliferation of low-risk on- and off-road bicycle facilities, which limit the interactions with other motor vehicle traffic.

**3. Suitability of current regulatory frameworks for PMDs and e-bikes, informed by approaches in Australia and internationally;**

3.1. **E-bikes:** The previous changes to e-bike regulation to bring Australia's road laws into line with the European pedelec standards, first introduced in the state of Queensland under Minister Scott Emerson, was very successful. The change allowed importers to bring to Australia the safer and higher-standard e-bikes being mass-produced for the European market and other nations adopting the same standard, rather than restricting consumers and importers to the the few inferior offerings that met Australia's previous standards. We saw significant take-off of e-bike sales at that point, almost all of which were speed-limited pedelecs. I've personally purchased and ridden three different pedelecs in Queensland in the last decade. They been excellent in allowing me a great commute to/from the university without having to shower at work.

I don't recommend any significant changes to our current pedelec regulations, other than:

- Potentially changing the maximum speed allowed to 32km/h if (and only if) this becomes the European standard – bringing them into line with US Class 1 pedelec standards. Most of the world would be at 32km/h if this happens and it would make sense to continue to allow the best makes and models into Australia, not the rag-tag bunch of manufacturers Australian e-bike consumers had to choose from before we adopted the European standard.
- Allowing a throttle or similar device to initially propel the rider, but not to allow sustained operation of the motor. Many of the latest European pedelecs include this feature. It maximises the rider's stability on take-off, minimises wobble, and keeps the rider travelling straight. It's particularly helpful if carrying extra weight (i.e. children). This safety feature should be embraced and not discouraged.

More recently, Australian importation rules appear to have been relaxed, allowing importers to bring large quantities of US Class 2 or 3 throttle e-bikes with >500W power that do not require pedalling to keep the motor on. These would not generally be considered legal to ride on-road under Queensland law. Whether sold for off-road use only to the customer without a speed-limiter, or being 'chipped' to remove a speed-limiter after sale, many of these vehicles seen on-road in Queensland are capable of reaching speeds in excess of 50km/h. The trauma rates in Australia for this particular new class of e-bikes are not known, as the particular class of e-bike is not collected in police incident or hospital admissions data. But US trauma rates are not good, in part as helmets are not generally required under US law[9]. Here, throttle e-bike popularity with young males, especially teenagers, is evident from the numbers seen in inner and suburban-Brisbane, and on the Gold Coast.

While in Queensland there were fewer problems with Class 1 pedelecs being ridden by persons 16 and older, the fat-tyre throttle e-bikes have changed the situation.

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[8] See: Gu, Tianqi, Inhi Kim, and Graham Currie. "The two-wheeled renaissance in China—An empirical review of bicycle, E-bike, and motorbike development." *International journal of sustainable transportation* 15.4 (2021): 239-258; Dong, Wanyue, et al. "Temporal trends in the incidence and mortality of road injuries in China: Current trends and future predictions." *Injury* 54.12 (2023): 111139.

[9] Pitcher, Graysen, et al. "The Impact of Helmet Use on Injury Severity and Clinical Outcomes in E-Bike Riders." *Cureus* 17.5 (2025).

Europe has introduced another classification of e-bike, the “speed pedelecs” or S-pedelecs, which are similar to our current Class 1 pedelecs but which offer speeds up to 45km/h. These would likely be more suitable as an addition to the Australia fleet than the US-style Class 2 or 3 throttle bikes we are currently importing. But they are not without their issues. Studies of user behaviour has shown that S-pedelec riders tend to cruise at under 40km/h[10]. But Dutch S-pedelec users reported that even bicycle facilities in that nation are not designed sufficiently for this new class of e-bike. It is likely S-pedelecs are only suitable for on-road use and on higher-standard bicycle-only paths, such as the V1 veloway alongside the Pacific Motorway; they may be unsuitable on many shared paths.

In my personal view, were S-pedelecs or Class 2 and 3 powered two-wheelers to be allowed on-road in Australia the Chinese regulatory approach offers many advantages. In China this class of vehicle:

- has a maximum power limitation;
- is speed-limited;
- is prohibited from certain roads, such as motorways;
- must be registered; and,
- requires an appropriate helmet (not a bicycle helmet for US Class 2 vehicles);
- can be ridden on some off-road bikeways (such as our bicycle-only Veloways);
- cannot be ridden on many shared-paths or on footpaths.

I personally recommend speed-pedelecs and any Class 2 or 3 throttle e-bikes allowed on-road be restricted solely to those 18 and older, given their higher power, acceleration and/or potential speeds.

3.2. **E-Scooters:** It is likely time that e-scooters are removed from the PMD classification and given their own class under Queensland road rules. Despite assertions that the mode is still evolving rapidly, there is twenty years of maturity from the initial trial designs to today’s vehicles. This is a similar timeline from the first arrival of motor-cars in Queensland to the arrival of the Model T Ford. It is easier for regulators to specifically say what an e-scooter can or can’t be, or what it can or can’t do, if they are given their own classification.

For instance, the state may wish to retain e-skateboards as a class of vehicle allowed under the PMD definition. But regulating a minimum front-wheel size for e-scooters would effectively ban e-skateboards that rarely have, say, a 10-inch wheel size. Putting e-scooters in their own class would overcome this problem.

See our report to DTMR for more information on suggested changes to e-scooter dimensions including:

- Minor changes to maximum length and handlebar widths;
- A minimum front wheel size; and,
- Changing the measurement of e-scooter length to a wheelbase measurement, in part to allow larger front wheel sizes for improved safety.

**4. Effectiveness of current enforcement approaches and powers to address dangerous riding behaviours and the use of illegal devices;**

[10] Herteleer, Bert, et al. "Analysis of initial speed pedelec usage for commuting purposes in Flanders." *Transportation Research Interdisciplinary Perspectives* 14 (2022): 100589.

4.1. **E-Scooters:** See our report to DTMR for more information on suggested changes to dimensions including:

- Changing the measurement of e-scooter length to a wheelbase measurement, in part to make it easier for police enforcement. QPS representatives indicatively approved of this change in our interviews, noting it would allow for much easier measurement of length in the field and at a police station.

**5. Communication and education about device requirements, rules, and consequences for unsafe use**

5.1. The most stable stance for a rider of any moving board, whether that be a surfboard, a skateboard or an e-scooter, is one foot forward of the other pointing forwards and the other at the rear pointing horizontally across the board. This rider position allows much greater stability and the pre-positioning of the rider's bodyweight to better absorb forces from such manoeuvres as travelling up and down kerb ramps, coping with objects buffering the wheels, or rapid full-force braking. This is basic 'Biomechanics 101'. It is a stance that can reduce the most dangerous head-ground crashes, given the rider's bodyweight is moved further back on the board, behind the pivot point of a stopped front wheel.

This preferred stance is <u>not</u> what is pictured in most imagery produced by e-scooter companies, retailers or regulators. Instead, the highly inferior two-feet-together standing-straight pose is usually pictured, all but recommending this rider position to new users. This places the rider's body-mass forwards, towards the front wheel, and is much less stable.

Encouraging a safer rider stance should be considered. I've raised this with the e-scooter hire companies (Beam and Neuron) and with regulators in the past, none of whom have disputed my assertion about the safety benefits of a better rider stance. But there has been negligible attention given to this issue.

Thanks again for the opportunity to provide this submission. I would be happy to discuss these issues further with the committee, should you seek to do so.

Yours truly,

Adjunct Professor Matthew Burke