# ACRS Submission to Inquiry into the Transition to Electric Vehicles

***About the Australasian College of Road Safety***

The Australasian College of Road Safety was established in 1988 and is the region's peak organisation for road safety professionals and members of the public who are focused on saving lives and serious injuries on our roads.

The College Patron is His Excellency General the Honourable David John Hurley AC DSC (Retd), Governor-General of the Commonwealth of Australia.

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## Introduction

The Australasian College of Road Safety is the region's peak membership association for road safety with a vision of eliminating death and serious injury on the road. Our members include experts from all areas of road safety including policy makers, health and transport professionals, academics, community organisations, researchers, federal, state and local government agencies, private companies and members of the public. The purpose of the College is to support our members in their efforts to eliminate serious road trauma through knowledge sharing, professional development, networking and advocacy. Our objectives include the promotion of road safety as a critical organisational objective within government, business and the community; the promotion and advocacy of policies and practices that support harm elimination; the improvement of relative safety outcomes for vulnerable demographic and user groups within the community; the promotion of post-crash policies and practices; and the promotion of a collegiate climate amongst all those with responsibilities for and working in road safety.

The College believes that we should prevent all fatal and serious injuries on our roads; the road traffic system must be made safe for all road users; system designers should aim to prevent human error and mitigate its consequences; life and health are not exchangeable for other benefits in society; and that all College policy positions must be evidence based.

## General comments on Electric Vehicle transition

While we have addressed the terms of reference specifically below, we would like to mention some general considerations reflecting the safety mission of the ACRS:

- The transition to electric vehicles (EVs) is an opportunity to not only reduce emissions from transport, but with the right policy reinforcement, to also improve other fleet characteristics. Changes in policies to allow growth in EVs should also improve conditions for other aspects of road safety. These could include modal shift, speed management, road user attention (and distraction). We should not lose sight of these aspects of road safety as we transition the vehicle fleet.

- We must be careful to ensure there are no unintended negative safety outcomes from the introduction of EVs and manage them where possible. We address some of these below but would mention in particular a concern about the increased mass of EVs relative to their internal combustion engine (ICE) counterparts, the acceleration characteristics of some of these vehicles, and the potential for fire incidents.

## ACRS response to the Terms of Reference

### 1. The establishment of resources, systems and infrastructure required to support transition to EVs

**Electric Powered Two-Wheelers**

While the most attention has been given to the growth of electric passenger cars and commercial vehicles, the establishment of resources, systems and infrastructure should not neglect the growth in electric Powered-Two-Wheelers (EPTWs).

These vehicles may have won less mindshare amongst policy makers, but are making their presence felt, especially in the urban areas of Australia. EPTWs are most commonly seen in the form of electric scooters (eScooters) and electric bicycles, both of which very popular with commuters and delivery riders, especially in CBDs and other congested areas. A policy response is needed to accommodate the increased take-up of these EPTWs. In some situations, it will justify a significant investment in special facilities for low speed EPTWs, possibly designed to also work for bicycle and other active transport users. This is particularly the case if the increased mass of EVs is considered to have a negative overall road safety impact (discussed below).

Electric motorcycles (i.e. requiring a license to ride) are also starting to appear, and while their market share is still small, they may follow a similar trajectory of growth that we have witnessed with passenger car EVs. This means that policymakers should be considering them now as part of our future fleet.

At a physical level, charging infrastructure to support the transition to EVs should provide for commonality and compatibility with a standardised plug and specifications applied to EPTWs, similar to current efforts to standardise charging plugs for passenger and commercial EVs.

**Safety implications of range anxiety and inaccessible chargers**

At a commercial level, consider regulatory efforts to influence the EV charging industry to adopt practices which lower the barriers to entry for new users. A common problem in practice is that a given EV charger requires the driver to have set up an account with that provider. With 8-10 different charging networks in Australia, drivers are having to set up multiple accounts to ensure adequate coverage. In some cases, the charger is located away from mobile data coverage, preventing the new customers from signing up on the spot. A better solution would be to mandate acceptance of credit cards or some other ubiquitous payment method. While this may be seen as an inconvenience, there are safety implications arising from drivers who, after unsuccessfully attempting to charge their vehicle, keep on driving but are distracted or upset due to their range anxiety.

**Emergency services response to lithium-ion batteries damaged in a crash**

It is uncertain the extent to which the risk of battery thermal runaway in EVs can be managed by fire and rescue crews in Australia. The risk of battery thermal runaway is significant even in the smaller batteries used in EPTWs. Appropriate post-crash protocols and best practice should be established.

**Electrified highways**

Sweden is planning to build a permanent electrified highway by 2025 that would enable EVs to charge while they are being driven.(1) This uses a conductive charging system which relies on a charging rail embedded in the roadway. Inductive charging roads have also been deployed in the USA.(2)

If such roads were to become commonplace, EVs could be more acceptable with smaller, lighter batteries. The mass of a vehicle is a large determining factor to crash outcomes due to the kinetic energy contained in a moving vehicle.(3) EVs with smaller batteries will be more attractive and will have a positive impact on overall road trauma outcomes. A further benefit would be less range anxiety.

## 2. The impact of moving from internal combustion engine vehicles, including fuel excise loss, existing auto industry component manufacturers and the environment

**Opportunity for new policy levers**

The shift from ICE vehicles to EV is an opportunity to shift from the existing revenue stream based on fuel excise to a new formula that accounts for congestion, environmental impact AND safety. Transport economists have long promoted the benefits of road pricing to address congestion.(4) This should be broadened to include safety characteristics (e.g. differential road pricing to take into account ANCAP ratings, vehicle mass and other safety considerations). The changing circumstances and vehicle fleet composition give government a reason for change.

The recent High Court decision to block Victoria's usage based EV tax(5) shows that such charges are for the Commonwealth to impose, and provides an opportunity to implement new policy levers that have a broader base than just distance travelled.

**Lack of an EV safety record**

While the safety record of ICE vehicles is well established, the operating characteristics of EVs are sufficiently different from ICE vehicles that we cannot assume that they will be equally safe. EVs differ in the following ways:

- they are essentially silent at low speed, and may not be readily heard by other road users, particularly pedestrians and cyclists, suggesting the need for Acoustic Vehicle Alerting Systems(6)
- they are heavier, containing more kinetic energy for a given speed, and therefore may be expected to result in worse trauma outcomes
- they accelerate quickly from rest due to instant motor torque
- at current premium market positioning, they tend to be equipped with advanced safety features such as ADAS (though this may change as the EV market matures)

A research program should be funded to investigate whether EVs are more, less or equally safe compared to the existing vehicle fleet, and to identify the most relevant factors that influence the safety of EVs.

## 3. The opportunities for fuel savings, such as by combining EVs with other consumer energy technologies and savings for outer suburban and regional motorists

The College has no comment.

## 4. The impact upon electricity consumption and demand

The College has no comment.

## 5. The opportunities for expanding EV battery manufacturing, recycling, disposal and safety, and other opportunities for Australia in the automotive value chain to support the ongoing maintenance of EVs

**Recycling of vehicle batteries**

The shift towards EVs will increase the amount of chemical battery material that will need to be disposed of. There are some schemes where an EV battery that is no longer fit for vehicular use is then repurposed as static batteries to support the power grid. Regardless of this, the chemical material remains present and will need to be dealt with at some stage.

**Lower running costs**

Early evidence suggests that the operating cost per kilometre of EVs are significantly lower than that of ICE vehicles due to reduced powertrain complexity.(7) The upfront purchase costs of EVs also appear to be reducing steadily as more competitive models enter the market. The lower total cost of ownership may provide opportunities for owners from lower socioeconomic backgrounds to keep up with regular maintenance, resulting in safer outcomes.

Lower running costs are likely to encourage people to drive more, leading to greater exposure to traffic crash risk.

## 6. The impact of Australia's limited EV supply compared to peer countries

The College is concerned about Australia's limited EV supply compared to peer countries. There appears to be a correlation between EV models and advanced driver assistance safety features such as lane keeping assistance and blind spot monitoring.

Compared to peer countries, Australia's lack of financial incentives for EVs and vehicle emissions standards means we run the risk of becoming a dumping ground for ICE vehicle models that are cheaper to manufacture.

Being a relatively small market, it may be difficult for a manufacturer to justify developing a specific package of equipment that caters to our unique needs. Therefore the manufacturer is more likely to fulfil the Australian market with Low to Middle Income Country specification vehicles that lack safety features.

## 7. Any other relevant matters

**Electric PTWs (further)**

It is of some concern that the terms of reference do not make any mention of EPTWs such as electric motorcycles, bicycles and scooters. These vehicles have the potential to meet urban transport needs in a highly efficient way, but due to their vulnerability, require separated infrastructure in order to fit into the Safe System Approach.(8)

In the absence of regulation and policy, these vehicles are being imported into Australia and are being used on public roads. It is imperative that all levels of government take steps to ensure that their take up is monitored and regulated to ensure road safety is not eroded. Indeed the shift towards EVs can be leveraged to actively improve safety outcomes, as outlined previously.

**Eco-safe driving**

The growth in EV market penetration creates opportunities for the promotion of "eco-safe driving." This is the conscious practice of avoiding unnecessary acceleration and braking by drivers applying their awareness, anticipation and planning. Despite industry acceptance that eco-safe driving is beneficial, there is little existing research on what is the best practice in eco-safe driving style in terms of efficiency and safety.(9) Adding to the complexity of the situation, EVs broadly perform regenerative braking upon deceleration. While this improves efficiency, it is unknown what impact it may have on safety. Research could be undertaken to study any resulting effects and the extent to which they occur.

**Motor torque characteristics**

Compared to combustion engines, electric motors have the ability to provide instant maximum torque from zero engine speed. Motors respond instantly and strongly to driver inputs, which make it easier to overwhelm tyre grip and result in a skid, unless adequate traction or stability controls are fitted.

**Vehicle mass**

The energy density of a vehicle traction battery in terms of kWh/kg is a fraction of that of fossil fuels such as petrol and diesel. This then requires manufacturers to include a large quantity of batteries per vehicle in order to deliver an acceptable range between recharges, with commensurate increases in vehicle mass. As an example, the BMW iX3 is a battery EV (BEV) identically sized to the petrol-engined BMW X3 30i and is largely aimed at the same target market. The following table compares the two (information from Redbook, 2023 models):

| | **Petrol X3 xDrive30i G01 LCI** | **BEV iX3 G08** |
|---|---|---|
| **RRP** | $96,500 | $104,900 |
| **Power** | 185kW 4-cylinder turbo petrol | 210kW electric motor |
| **Tare mass** | 1768kg | 2180kg (23% more) |
| **Drive** | AWD | 2WD |
| **Range** | 823km (combined cycle) | 460km (WLTP) |

The example above shows that the EV carries an extra 23% tare mass, and that the mass premium is already mitigated by other product decisions such as excluding AWD capability and a significantly curtailed range (albeit a range figure that is still acceptable to the target customer).

Alternatively, a manufacturer may choose to reduce weight by limiting range, as in the case of the Mazda MX-30 outlined below (information from Redbook, 2022 models):

| | **Petrol MX-30 G20e Astina** | **BEV MX-30 E35 Astina** |
|---|---|---|
| **RRP** | $41,190 | $65,490 |
| **Power** | 114kW 4-cylinder petrol MHEV | 107kW electric motor |
| **Tare mass** | 1440kg | 1659kg (15% more) |
| **Drive** | FWD | FWD |
| **Range** | 797km (combined cycle) | 200km (WLTP) |

The above examples show that functionally identical cars are heavier as an EV than with an ICE powertrain.

The amount of kinetic energy within a moving vehicle is directly proportional to its mass. Where a given ICE vehicle is directly replaced with its BEV equivalent, it is reasonable to assume that the heavier vehicle will result in higher severity crash outcomes, which is expected to become evident as the market share of BEVs increases over time.

## Conclusion and Recommendations

ACRS welcomes this inquiry and appreciates the opportunity to comment and contribute to improved safety as a specific focus of managing the transition to EVs. We recommend:

- The growth in electric powered two-wheelers (EPTWs) must be considered within the scope of this inquiry
- Charging infrastructure should be regulated so as to maximise accessibility and reduce barriers for the end user
- Post-crash protocols for EVs should be developed and formalised
- Innovative charging infrastructure such as electrified highways and charging roads should be pursued as they directly address the primary weakness of battery EVs, resulting in many benefits.
- The shift away from fuel-based excise is an opportunity to be grasped so that societal benefits to safety and environmental impact can be realised alongside congestion reduction.
- Vehicle importers should be incentivised to bring in the latest technological advancements by aligning Australian market regulations with best overseas practice.
- A research program should be funded to investigate compare EV safety to the existing vehicle fleet, and to identify the most relevant factors that influence the safety of EVs, including their different driving characteristics and the potential for “eco-safe” driving.

Please do not hesitate to contact me should you require any further information.

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