



Australian Motorcycle Council Inc.

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AMC Position Statement – **Electric Motorcycles and Scooters**

As electric vehicles become more popular and infrastructure is introduced to support them, we need to ensure that motorcycles and scooters are adequately catered for so they are a convenient and viable means of transport.

Priority:- Medium (information current March 2012)

Where we are now:

Electric motorcycles and scooters have the benefits of no on-road emissions and cheaper maintenance, however, they have the disadvantage of higher purchase cost and limited life of expensive batteries.

There are very few electric motorcycles or scooters currently in use or for sale in Australia. Those that are, all have long charging times which make them suitable only for commuting where they can be recharged overnight or at work during the day. All can currently be recharged from a domestic 10 amp or 15 amp outlet. Due to the specialised batteries used, specialised chargers are needed to control the recharging cycle, the chargers are either on-board or standalone. Having a standalone charger further restricts when and where the vehicle can be recharged.

Fear that an electric vehicle will have insufficient range to reach its destination and thus leaving the vehicle's occupants stranded, has been termed "Range anxiety". Range anxiety is considered to be the main cause of the slow take up of electric vehicles.

Motorcycle and scooters currently available or in use in Australia,

	Drive	Battery	Charge Time	Charger	Range
Zero ZF9		Lithium-ion	Quick charge 2.4 hours		183km City
V-moto E-moto		Silicon 48V/60Ah			170km at 25km/h
Vectrix (expects to re-enter the market with 3 models, VX1, VX2 & VX3)					
Honda (only)		Lithium-ion		Standalone	

on evaluation)		72V / 12.6Ah		unit	
Yamaha (reports in the media only)		Lithium-ion 50V			26.7 miles
eRider "Lighting Bolt" scooter	5kw and 8kw versions				90 km
eRider "Thunder Bolt" scooter	5kw and 8kw versions				100 km
eRider "Native GPR-S" motorcycle	14.2kw				100 miles

It is considered there are 3 types of recharging that need to be provided:-

- Domestic
- Commercial recharging stations
- On-street (note:- there are already some of these available)

While it has still to be resolved, it appears there will be 3 Levels of charging

Level	Definition	Technology	Plug (connector)
Level 1	AC energy to the vehicle's on-board or standalone charger	240 volt, 10 or 15 amp	Current domestic 3 pin plug, 10A (2.4kw) or 15A (3.6kw)
Level 2	AC energy to vehicles on-board charger	240 volt up to 80 amps	SAE J1772 5 pin plug (16.8kw) [#]
Level 3	DC energy from an off-board charger	Very high voltages (300 to 600 V DC) very high currents (hundreds of amps)	CHAdEMO (62.5kw) [#]

[#] a 'Combo' (combination) Plug is being developed that would be suitable for both AC and DC current

The additional pins in the J1772 and CHAdEMO plugs allow for safety interlocks so the vehicle is immobilised while plug is connected and disconnects the power should the plug be inadvertently removed during the charging cycle. The additional pins also allow for communication between the vehicle and charging station, this allows for programming when the vehicle is recharged to take advantage of cheaper electricity costs and also allows for energy to transfer from the battery to the grid during peak times of demand. This allows the owner to sell power to the grid at a higher rate and then purchase it back at a cheaper off peak time. This concept is part of a Smart Grid proposal.

Charging time is dependent on the rate at which energy can be transferred. If a motorcycle is filled with 15 litres of petrol and this takes 15 minutes including payment, this is an average energy transfer rate of around 600kw. Even allowing for the higher efficiency of an electric motor versus a petrol one, the electrical charging rates in the table above are quite modest.

An alternative to having to wait for a battery to be recharged is to exchange a discharged battery for a recharged one, this is called “Battery Switch” or “Battery Swap”. This not only reduces the time to ‘recharge’ the vehicle to about 1 minute, but also allows for the leasing of batteries rather than purchasing them outright. As a large proportion of the cost of an electric vehicle is the battery, leasing batteries can significantly reduce the cost of converting to an electric vehicle. Battery switching does, however, require that there be a large numbers of vehicles with a common battery.

Issues that need to be resolved to make electric motorcycles & scooters viable:-

- Shorter charging times – in the order of 15 minutes
- Longer ranges
- On-board battery chargers
- Common plugs
- Provision of extension leads at charging station to remove the need to carry them
- They need to be crashworthy so electrical hazards don’t present an undue risk to the rider or rescuers
- Registration and insurance costs are set at appropriate levels

Where we want to be:

Issues restricting the take-up of electric motorcycle and scooters are taken into consideration when developing infrastructure and standards for electric vehicles

How to get there:

- Maintain representation on Standards Australia’s electric vehicles committees
- Maintain contact with manufacturers and importers of electric motorcycles and scooters
- Lobby road authorities and CTP insurance agencies
- Encourage feedback on this Position Statement and on electric motorcycles and scooters in generally, comments to be sent to:- committee@amc.asn.au