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To: Inquiry Secretary
House of Representatives Standing Committee on Climate Change, Energy, Environment and Water
Inquiry into the Transition to Electric Vehicles

Dear Sir/Madam,

This submission is provided by the Australian Electric Vehicle Association Ltd (AEVA). We are a volunteer-run, not-for-profit organisation dedicated to switching Australia's transport networks to electric drive as quickly as possible. We are electric transport advocates, and primarily represent the consumers and end-users of electric vehicle (EV) technology through dissemination of knowledge based on lived experience. Formed in 1973, AEVA continues to serve as a vital public forum for Australians to learn about EVs and the enormous benefits the technology provides. We thank the Committee for this opportunity to make a submission to the Inquiry.

TERM OF REFERENCE 1: The establishment of resources, systems and infrastructure required to support transition to EVs

In this submission, we will focus on two aspects of "systems and infrastructure": public charging infrastructure and import regulations.

Public charging infrastructure

Our detailed observations on the needs of EV drivers for public charging infrastructure can be found in Appendix 1. These observations cover:

- the fact that most EV charging occurs at home;
- the need to provide a mixture of rapid Direct Current (DC) charging and slower AC charging in public infrastructure, depending on the situation;
- the opportunities to install slower 'destination' charging at a modest cost by businesses, retailers, cafes and pubs, shopping centres, caravan parks and motels;
- the opportunities to install kerb-style charging in residential locations with low availability of off-street parking;
- the need for reliability (uptime) guarantees where governments provide financial assistance to install charging infrastructure;
- the need for EV owners to charge in a convenient manner when towing; and
- the need for EV charging to meet the needs of drivers with disabilities.

We recommend that:

- State, territory and local governments seek advice from AEVA on how to develop a well-planned regime of local charging infrastructure which meets the needs of EV drivers, including drivers with disabilities.
- Where governments provide financial assistance to install charging infrastructure, contractual agreements should mandate specific reliability guarantees.
- Governments commence a dialogue with providers of EV rapid chargers concerning flexible payment mechanisms, open charging data and the visibility of fees.

Import regulations

More affordable EVs are entering the Australian market, but equitable access to EVs remains an issue. We must meet the needs of Australians who routinely purchase used vehicles.

In order to bring the purchase of an EV within reach of most Australians, AEVA believes strongly that there needs to be a strategy to make used EVs more widely available prior to their release at scale from Australian company and government fleets.

For this reason, AEVA urges that the current limitations on the import of second-hand EVs be removed. The *Road Vehicle Standards Act 2018* and the subordinate *Road Vehicle Standards Rules 2019* (specifically clauses 129 and 129A) are currently restricting the import of used zero emission vehicles. These clauses prevent the independent import of vehicles which have been previously imported into Australia by the manufacturer, even if only very small numbers (say 100 or so) were imported. An amendment to allow independent importers to import previously imported vehicle models would allow a greater variety of cheaper EVs to be offered for sale in Australia.

To give a striking example, it is currently not permitted to import 2018 Hyundai Ioniq hatchbacks from the United Kingdom, even though Hyundai dealerships in Australia have been servicing this model since late 2018; the operators handbook is in English; Hyundai has announced that it has ceased production of this model anyway; and the only changes needed for Australian roads are the substitution of an Australian mains plug on its portable charge cord and the substitution of Australian maps in the navigation system.

There is now a growing number of independent mechanics (not affiliated with dealerships) who can properly service EVs and in some cases offer battery upgrade packages. It is essential that these workshops are able to continue their good work without manufacturers attempting to obstruct them through proprietary systems.

Finally, electric motorcycles and scooters are not encumbered with steering wheel location issues, and as such, ought to be easier to import than a car. However, despite there being dozens of makes and models of e-motorcycles on the international market, they remain very difficult and expensive to homologate into the Australian market. Reducing barriers to the parallel import of electric two-wheelers would deliver more lightweight, congestion-busting EVs for Australia.

We recommend that:

- The *Road Vehicle Standards Act 2018* and the *Road Vehicle Standards Rules 2019* be amended to allow independent importers to import previously imported vehicle models into Australia.

- The Federal Government eliminates, or at least works to reduce, any barriers to the parallel import of electric motorcycles (all L-class vehicles).

TERM OF REFERENCE 2: The impact of moving from internal combustion engine vehicles, including fuel excise loss, existing auto industry component manufacturers and the environment

In this submission, we will focus on:

- the public health benefits of the EV transition;
- the energy security benefits of the EV transition; and
- fuel excise loss

Public health benefits

A reduction in urban air pollution is one of the key benefits from the move to electrified transport and was one of the major drivers of this policy in large Chinese cities like Shenzhen, as well as the formation of the Ultra Low Emission Zone (ULEZ) in London.

London's ULEZ was driven in part by the high incidence of respiratory disease, especially in children, with a couple of high profile cases. Diesel engines are known to release gases and particles which exacerbate asthma and other respiratory and allergic diseases[1].

Cognitive dulling has been demonstrated in acute exposure to diesel fumes, and proximity to major roads is associated with increased incidence of Alzheimer's, heart and respiratory disease. The latter correlates with levels of nitrogen oxides.

It is clear, therefore, that the transition to EVs will provide several major positive health outcomes.

Energy security benefits

With only two domestic oil refineries in operation, Australia imports somewhere between 80-90% of its petrol and diesel, mostly from Singapore, Malaysia and Vietnam. Australia does not have sufficient crude oil production or reserves to meet domestic needs, and our refineries are too small to compete with those countries supplying our fuel needs. Our entire fuel importation system is exposed to global shocks and price fluctuations[2].

A blockade of the Straits of Malacca could quickly cripple transport in Australia. EV transport has an obvious advantage here. Australia's bottom line would also improve as we imported A$46.1 billion in "mineral fuel" (petroleum oils, crude oil and petroleum gases) in 2022[3].

Analysts such as Air Vice-Marshal John Blackburn have called for Australia to speed up its transition to EVs and other forms of green transport, saying the country's heavy reliance on imported oil is a "massive" security weakness. In his view, Australia needs to "grasp the energy transformation challenge opportunity and drive a significant proportion of its

[1] Pandya, Robert J, et al. Diesel exhaust and asthma. Environmental health perspectives, 2002 Feb;110 Suppl 1(Suppl 1):103-12. https://pubmed.ncbi.nlm.nih.gov/11834468/
[2] Australia Institute. Over a barrel: addressing Australia's liquid fuel security. https://australiainstitute.org.au/report/over-a-barrel/
[3] International Cargo Express. https://icecargo.com.au/top-10-imports-exports/

transport dependence away from imported fuels as soon as possible"[4].

To deal with the above imperatives, Australia should aim to reduce its level of oil imports to near zero by 2045, driven by a transition to full electrification of transport. This transition should be encouraged by incentivising the take-up of EVs and by de-incentivising the purchase or retention of internal combustion engine (ICE) vehicles.

Fuel excise loss

Australia's roads must be maintained to a high standard for the safe and efficient movement of people and goods. The fuel excise, which levies a 47 cents per litre cost on liquid fuels, is projected to raise an average of $16.9 billion per year over the four financial years to 2026/27, according to the 2023 Federal Budget. Since 1959, all Commonwealth government funding for roads has come from consolidated revenue. Prior to this, the fuel excise was hypothecated to road construction and maintenance.

AEVA accepts that, as EVs transition to dominate the national passenger vehicle fleet, a road user charge (RUC) will become the primary means to raise revenue. This is a sensible thing to do on the condition *all road-going vehicles are subject to it.* Any RUC should be *multiplied by the mass of the vehicle*; accounting for wear and tear proportionally.

A mass-multiplied RUC would:

- ensure that all motorists are directly paying proportional to their wear on road infrastructure; and
- help drive a downward shift in vehicle mass; lighter vehicles cause less wear on infrastructure, are cheaper to run and safer for cyclists and pedestrians.

We envisage that an RUC in the order of 1 to 3 cents per kilometre and tonne would apply to the annual mileage of the vehicle, which is then multiplied by vehicle tare in tonnes. That is, total cost = km travelled x mass in tonnes x RUC.

The RUC should apply universally to all light vehicles regardless of their fuel source. Heavy goods vehicles are currently entitled to a 50% subsidy on fuel excise, so an effective RUC based on distance and tonnages carried could be optimised, allowing them to participate in the same scheme. Federal fuel excise may eventually be phased out, but its retention would effectively be a 'pollution tax' and serve as a disincentive to drive an ICE vehicle.

Crucially, the Federal government should collect this RUC revenue and redistribute the proceeds to states proportionally. The administration of such a scheme could be managed by the states and territories as they already have the mechanisms in place through vehicle licensing departments, with an annual odometer reading at renewal time. Such an RUC should not be implemented until EVs make up more than 30% of all new vehicle sales nationally, and ICE vehicle sales are on a clear downward path.

[4] Blackburn, John. Australia's perilous over-dependence on imported fuel. Defense.info, 17 March 2022. https://defense.info/re-shaping-defense-security/2022/03/australias-perilous-over-dependence-on-imported-fuel/

We recommend that:

- the Federal Government plan to introduce a federally-collected, state-administered, mass-multiplied road user charge (RUC) applicable to all road-going vehicles under 4.5 tons GVM;
- a fuel excise remain in place, possibly at a reduced rate, to serve as a disincentive to burn liquid fossil fuels for transport, and to motivate the shift to EVs; and
- such a scheme not be implemented until EVs represent more than 30% of all new vehicle sales nationally, or until they represent at least 5% of the national fleet of passenger vehicles, whichever happens first.

TERM OF REFERENCE 3: The opportunities for fuel savings, such as by combining EVs with other consumer energy technologies and savings for outer suburban and regional motorists

Opportunities for fuel savings

The savings that come from operating an EV are generally well understood. In addition to low maintenance costs, EVs charged slowly have running costs that are a fraction of the cost of ICE vehicles. For the many Australians that live in freestanding houses, it is possible for an EV to be one part of an all-electric home powered by renewable energy that can save households thousands of dollars per year.

EVs are inherently more flexible than ICE vehicles because they can be charged in a range of locations and at varying charging speeds and prices. This flexibility provides EV drivers with more options to charge their EV in a way that minimises running costs.

For EV drivers who live in freestanding houses and have rooftop solar PV, charging using one's own solar electricity is by far the cheapest option. Typically, this costs about $1.50 to drive 100 kilometres (the opportunity cost of any feed-in tariff). To maximise the use of solar electricity, charging can be scheduled simply by observing the weather or through more sophisticated charging equipment that ensures that only surplus solar electricity is used to charge the vehicle.

For drivers with a parking space but without rooftop solar, the next cheapest way to charge is by using off-peak electricity. The cost of this is typically 15-20 cents per kWh at current prices and is still much cheaper than fuelling an ICE vehicle. EV charging equipment or the EV itself can be used to schedule this charging, making home charging very convenient.

Another option that is becoming more common as battery prices fall is a home energy storage system to store solar electricity during the day. This effectively allows EV drivers to charge at times other than when the sun is shining and removes the need for the car to be present during daylight hours.

For long distance trips, it is necessary to rely on public Direct Current (DC) fast charging infrastructure to provide charging en route. There has been recent comment about the high cost of public DC fast charging, but it should be noted that for most drivers, long distance trips (greater than 300 km per day) are not an everyday occurrence. The vast majority of EV charging is still done at home at much lower cost and so occasional fast charging does not considerably increase annual operating costs. A helpful analogy is to consider drinking water. Most of the water we drink can be sourced from home.

Sometimes, though, it is convenient to buy a chilled bottle of water at a shop. Bottled water is approximately 1,000 times the cost of home tap water, but when we buy bottled water, we understand it comes at a high premium for the convenience.

Opportunities for more energy savings with Vehicle-to-X (V2X)

Vehicle-to-X (V2X) is an emerging technology allowing vehicles to discharge their batteries for uses other than transport. There are three categories of V2X technology: vehicle-to-load (V2L), vehicle-to-home (V2H) and vehicle-to-grid (V2G).

V2L is simply a standard power point provided by the vehicle. An increasing number of EV models now provide V2L and these have been successfully used in disaster situations such as running fridges and freezers during extended blackouts. In 2023, a Queensland mother used V2L on her EV to run her son's dialysis machine after power cuts[5]. V2L is a very useful feature for emergency power providing modest amounts of power which is more than enough to run essential appliances. AEVA sees V2L as a useful technology that is available today without regulatory changes. We believe it is likely to become a standard feature of most EVs due to its low cost. V2L can save lives.

V2H allows a vehicle to power some or all circuits of a house provided they are isolated from the grid. In the case of V2H and V2G (discussed next), a bi-directional charger/inverter is installed at the house to generate mains voltage AC electricity from a connection to the vehicle. In many instances, an EV with V2H can replace the solar batteries being used by some households today. This provides a much larger energy store than a stationary battery and saves households the additional cost of such a battery. The financial benefits of V2H are that more solar PV generation can be time shifted into the evening peak period, avoiding peak charges. This has the potential to substantially reduce peak demands on the grid, but it requires that customers be appropriately compensated for the system-wide benefits to make the economic case stack up. V2H can also provide valuable backup power with automatic changeover to EV power.

V2G is the next progression and involves injecting power back into the grid just as solar PV systems do. Additional savings can be generated by using the EV to provide more power to the grid during high demand periods and potentially for other grid services. Payments for these services can reduce the householder's electricity bill with minimal wear and tear on the EV battery. However, V2G is currently held back due to the formalised requirement of a number of standards and poor product availability.

V2L, V2H and V2G all offer the ability to use the EV battery to save money, be it by preserving the contents of a freezer in an extended blackout, by time shifting solar electricity into peak demand periods or participating in the provision of grid services. When consumers understand the additional value that an EV provides as described above, it can help them justify the additional expense, currently, to purchase an EV.

[5] The Guardian, 1 January 2024. https://www.theguardian.com/environment/2024/jan/01/amazing-queensland-mum-uses-electric-car-to-save-sons-life-with-dialysis-during-power-outage

We recommend that:

- Governments implement loan schemes, with low or zero interest loans (similar to the ACT's Sustainable Household Scheme) to allow low-income households to invest in V2X technologies, with loan repayment facilitated by the savings from the investment.
- Governments undertake to improve V2G product availability by clarifying standards requirements and assisting product suppliers by establishing a testing lab to prove compliance.
- Governments conduct education campaigns to help consumers understand all of the non-transport benefits of EVs.
- Governments ensure that consumers are appropriately compensated by their electricity retailers for services they provide to the grid, such as peak demand shaving and energy regulation (raise/lower) services.

TERM OF REFERENCE 4: The impact on electricity consumption and demand

To contextualise the impact of a large number of EVs on the electricity grid, it is useful to understand how individual vehicles are typically charged in a residential setting. EV owners who live in detached housing, and who already have (or can install) a power point in their garage or carport, often find their EV charging needs are easily met. Residential charging rarely needs to be fast as cars spend a long time parked. An ordinary power point servicing the portable Electric Vehicle Supply Equipment (EVSE) supplied with the car is often sufficient. This arrangement can add around 150 to 200 km of range during an overnight charge, which far exceeds the daily range requirements of most drivers.

Single phase 32 amp charging (7kW) or 15 amp three phase charging (11kW) with a portable or wall-mounted EVSE allows faster charging in a narrower time window, and enables the driver to make use of off-peak tariffs or rooftop solar power. Some home charging equipment, such as "Zappi"[6], can vary the EV charging rate to maximise the use of surplus solar electricity and minimise the use of grid electricity.

Demand on the grid varies through the day with a shape that has morning and evening peaks, a valley during the night and, increasingly, another valley in the middle of the day. This intra-day variation provides considerable scope for generating additional electricity during the low demand periods using existing generators.

The additional energy required to support EVs is often overestimated because comparisons are made with the energy content of fuel, disregarding the fact that around three quarters of the energy used in ICE vehicles is lost as waste heat and does not need to be replaced with electricity in an EV. Twenty million EVs travelling 11,000 km per year with average energy consumption (15.5 kWh per 100 km) would require around 34 TWh of additional electricity generation per year. For context, this represents an 18% increase over generation last year in the National Electricity Market. This increase can very easily be planned over the expected timeframe for a full transition to EVs.

Transmission and distribution networks are sized to handle the maximum demand, typically occurring on hot summer afternoons. New electrical loads like EVs should be integrated into the system in a way that does not unduly exacerbate this peak and induce costly network upgrades. It should be noted that new, large loads have been successfully

[6] https://www.myenergi.com/au/product/zappi

introduced before. In the 1950s and 1960s, electricity demand grew dramatically as households moved away from the direct combustion of fossil fuels and new labour-saving appliances became available. More recently, air conditioning (whose operation tends to be highly correlated with peak demand) was introduced without much public concern about its impact on the grid.

Many EV owners are able to charge their EVs slowly which helps reduce power demand and spread the load over many hours. Concerns about increasing peak power demand on the grid are readily addressed by existing measures to discourage charging during the peak periods and by EV features to make it easy to control charging times. Price signals such as time of use tariffs will encourage people to shift charging from the evening peak to off-peak periods where charging is considerably cheaper. Almost all modern EVs allow the driver to set the car to charge at a desirable time. This enables a driver to plug in whenever it is convenient without adding to the evening peak demand. So-called "convenience charging", whereby EV owners carelessly charge through peak demand periods, is largely a myth.

We recommend that:

- governments, electricity providers and AEVA undertake an education campaign to encourage EV owners to charge at home outside of the normal periods of peak electricity use.
- dealerships introduce their customers to the charge control settings of their vehicles as part of their vehicle hand-over.

TERM OF REFERENCE 6: The impact of Australia's limited EV supply compared to peer countries

It is well known that a limited number of EV models are available in Australia. This is constraining the adoption of EVs by Australian buyers, who are unlikely to compromise their individual requirements just to purchase an EV. Furthermore, in our experience, brand loyalty is also slowing EV adoption due to buyers waiting for their preferred manufacturer to bring an EV to Australia.

The impact of limited EV supply has delayed the availability of low cost, second-hand EVs. Relatively few EVs were purchased in Australia from 2010 to 2020. Had more EVs been sold in Australia in that period, the second-hand market would be much more developed by now. We can't change the past, but we can't afford to delay any longer.

Certain Australian market segments (such as compact SUVs and sedans) have a good range of EV models available, particularly in the higher price range. However, some segments have almost no EVs available. These include affordable small cars. Examples of models that are not available in Australia include the Dacia Spring, the Renault Twingo, the Citroen e-C3 and the Renault Zoe. These vehicles are small, lighter and much cheaper. They would provide a viable electric alternative to small ICE models. Their lack of availability is locking out a segment of buyers for these vehicles who tend to be younger, find that a small car is suitable for their lifestyle, and have less money to spend on a car.

Another segment with poor EV supply is light commercial vehicles. Access to EVs in this market segment would enable businesses to lower their operating costs, and hence lower costs for consumers in the wider economy. Elsewhere in the world, electric versions of

commercial vans are widely available. For example, Japan Post has a large fleet of small Mitsubishi EV vans[7]. Some utility vehicles (utes) are also available elsewhere, particularly in the United States where there is a strong preference for these. While there is clearly a need for electric utes in the Australian market, we point out that ute sales in Australia are not driven solely by customer preference for suitable work vehicles. Federal Government policies in recent years have supercharged demand for dual cab utes through favourable fringe benefits tax (FBT) rules for load carrying vehicles and instant asset write-off provisions.

AEVA believes that the proposed New Vehicle Efficiency Standard (NVES) is the most effective way to increase the availability of EV models in Australia. In its March 2024 submission to the final consultation on the NVES, AEVA indicated its preference for Option C over Option B, given that the benefit-to-cost ratios are virtually indistinguishable from each other. The benefits of Option C are greater and it can't be said that Option B is any more optimal than Option C.

The more stringent targets of Option C will lead to greater adoption of EVs and bring a wider range of EV models to Australian consumers more quickly. Once the targets become stringent enough, fuel efficiency gains in ICE vehicles (eg, through hybridisation) will be insufficient to meet the tightening targets, thus necessitating the sale of EVs to avoid financial penalties.

We recommend that:

- The Federal Government adopts Option C in its implementation of the New Vehicle Efficiency Standard to bring a wider range of EV models to Australian consumers more quickly.

TERM OF REFERENCE 7: Other relevant matters

Wireless charging

Australian innovation needs to be encouraged and promoted. For example, Sydney-based NOA[8] has a wireless charging technology easily adapted to charging EVs. A typical scenario is a 'mat' on the floor of a garage or car space. When a vehicle drives into the space, charging begins automatically and when the vehicle drives out of the space it stops. There are no heavy cables nor operational logistics that exist with current charger infrastructure (and which significantly disadvantage those with physical disabilities).

The only constraint on adoption of the NOA technology is that no EV manufacturer includes the receiver technology on the underside of their vehicles. For fleets with overnight parking, for example, the adoption of NOA wireless charging would substantially increase operational efficiency and convenience. It would increase take-up of EVs due to the convenience of wireless charging - much in the same way that wireless charging has become accepted in the mobile phone charging context.

EV insurance

As the cost of purchasing an EV falls, the cost and availability of insurance is increasingly a barrier to EV adoption.

[7] Poznan Motor Show. https://motorshow.pl/en/news/the-japanese-post-office-invests-in-an-electric-fleet/
[8] https://www.noathebrand.com/

There are currently no mainstream insurance policies in Australia that are tailored specifically for EVs. Few insurer websites or insurance policies even mention EVs.

Many EV owners have experienced significant increases in their comprehensive insurance premiums in the last year. Pricing patterns are often bewildering, with a very wide range of quotes across insurers for the same car and driver.

Overseas research shows that EVs are among the safest car models and also are much less vulnerable to theft. Higher insurance premiums are ostensibly due to the complexity of repairs, the delay in receiving parts from overseas, and a shortage of EV-qualified automotive technicians.

There is no published analysis of insurance claims and prices in Australia. We have suspicions that insurers view EV owners as less price sensitive and are simply profiting from the relative dearth of claims data. Mainstream insurers appear to view EVs as a distraction from their main business.

UK automotive risk intelligence company Thatcham Research issued a report[9] in 2023 highlighting the potentially significant implications of EVs for the insurance industry. The report noted that claims are around 25% more expensive than comparable damage to ICE vehicles, and that damage assessment and repairs are more complex for EVs. Other research has shown that write-offs are also more common, raising the importance of recycling and salvage. This report concluded that "there is no part of the motor insurance claims process which is unaffected by BEVs."

We are not aware of any similar research being conducted in Australia or any publicly available data on EV repair costs and insurance claims. Better data pooled across the industry could help insurers price more accurately and potentially reduce premiums.

We recommend that:

- the Government funds a cross-industry research program into EV repair costs and recycling/salvage; and
- the Government provides funding to state governments for EV training programs for mechanics and other automotive repairers.

We are happy to provide follow-up responses to any queries or concerns.

Yours sincerely,

Chris Jones
President, Australian Electric Vehicle Association

[9] Thatcham Research. https://www.thatcham.org/report-highlights-risks-to-battery-electric-vehicle-adoption-if-repair-and-insurance-sector-concerns-are-not-addressed/

APPENDIX 1: PUBLIC CHARGING INFRASTRUCTURE REQUIREMENTS

The transition to EVs will be supported by accessible, reliable and convenient fast charging infrastructure. The level of use of this infrastructure will reflect the fact that most EV charging occurs at home using lower powered AC charging.

Public charging should comprise a mixture of rapid DC charging, and slower AC charging (typically 7-11 kW) depending on the situation. The expectations of EV drivers for the speed of rapid charging are changing. Many drivers now seek charging speeds of 75 kW or more rather than the 50 kW which was acceptable in the recent past.

Slower 'destination' charging can be installed at a modest cost by businesses, retailers, cafes and pubs, shopping centres, caravan parks and motels. Accommodation providers should be encouraged to install many low cost 15A standard power points, rather than a smaller number of 7 kW AC charging stations. This would allow many more charging points to be available to guests with the available electrical capacity of the site and at 15A, drivers can recoup around 250 km of range overnight.

Both EV owners and venue owners need to understand the dwell time characteristics of their location, and plan a charging infrastructure to match. For example, shopping centres, where a customer is likely to spend an hour or more, do not need a 350kW ultra fast charger, whereas on a motorway it can reasonably be expected that drivers will want a short rest stop where ultrafast chargers are ideal.

Destination charging at places where cars can be found during daylight hours, such as car parks, can enable EVs to consume part of the excess of electricity supply in those hours from solar electricity generation.

In residential locations with low availability of off-street parking, kerb-style charging (e.g. lamp posts with a charge socket) could be introduced. Lamp posts around shopping centres, cafés and other commercial precincts which offer street parking could be similarly retro-fitted. Early pilots of this idea are proving to be successful[10].

For highway touring, EV drivers must have confidence that reliable charging will be available at regular intervals along major intercity routes and country towns. Since EV uptake is already growing rapidly, there is a clear need for substantial banks of EV chargers at regular intervals on Australia's highways. This provides greater redundancy in the event of individual charger outages. Suppliers of rapid chargers should be able to make these investments and receive an economic return through charging fees. For this reason, AEVA supports the recent measure by NRMA to convert its free chargers to paid chargers.

Subsidies for fast charging stations should be provided only to sites on non-economic routes or in locations which are essential to serve low population and infrequently travelled areas. Ideally they should be sited and configured to support residents of isolated communities that wish to switch to an electric vehicle.

Where governments provide financial assistance to install charging infrastructure, such agreements should require on-going reliability (uptime) guarantees. Chargers left out-of-

[10] ARENA. https://arena.gov.au/knowledge-bank/intellihub-street-light-pole-ev-charger-with-grid-integration-project-report/

order for extended times are a cause of considerable frustration among EV drivers and erode public confidence in EVs.

AEVA welcomes the recent initiative by Tesla to open up some of its 'Superchargers' to non-Tesla vehicles. Tesla has an excellent reputation for the reliability of its chargers and the addition of Tesla as a further supplier of charging services represents a valuable broadening of competition.

We note the increasing interest by traditional service station companies (such as BP and Ampol) in providing EV charging services. AEVA could play a role advising these companies, including on matters such as drive through charging, accessibility (for people with disabilities) and the numbers of chargers required at each site.

The CHAdeMO fast charging standard used by the Japanese brands is becoming less prevalent. While its demise is inevitable, there remains a need to maintain the CHAdeMO standard for the next five years at least, particularly since a significant number of affordable, used EVs will be imported from Japan under the existing parallel import rules.

EV owners need to be able to charge in a convenient manner when towing. Charging stations are not currently configured to allow a vehicle with a trailer to charge without unhitching or blocking access for other vehicles. Thus, there needs to be a shift towards "drive-through charging". Every charging station that services motorways or Class A roads should have at least one pull-through charging stand.

Public charging for e-bikes is best provided through facilities where the rider can observe the bike and be confident that it is not vulnerable to theft.

The needs of EV drivers with respect to public charging infrastructure are summarised as follows:

- Chargers must be accessible 24 hours a day, and be well signposted, with fees clearly visible;
- Public EV charging stations should be constructed to comply with disability access standards. In the absence of an Australian Standard, the RAA guidelines should be used as an interim measure[11];
- Chargers should be located near accessible amenities, such as toilets and food outlets;
- Charging stations must be well lit and be placed in areas well frequented at night;
- Chargers should cater for a wide range of EVs, including cars, motorbikes and e-bikes, whether personally-owned or hired;
- Payment should be through the use of a credit or debit card as a priority, with company-specific apps or (interoperable) RFID cards a reliable alternative;
- Charging for longer than 30 minutes at rapid (150 kW+) chargers should be discouraged through fee structures (e.g. inclining tariffs);
- Access to charger information in real time, for example using the Open Charge Point Protocol, allowing EV drivers to better plan their trips;
- Faults, damage and interruptions must be easy to report, 24 hours a day; and
- Maintenance and technical support must be prompt, reliable and effective.

[11] "Design guidelines for accessible EV charging stations" (RAA, 2023)