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Submission to the Department of Industry, Science and Resources

ATSE SUBMISSION ON NATIONAL ELECTRIC VEHICLE STRATEGY

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The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of around 900 independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology, and engineering, ATSE provides impartial, practical, and evidence-based advice on achieving sustainable solutions and advancing prosperity.

ATSE welcomes the opportunity to contribute to the Department of Industry, Science and Resources consultation on the National Electric Vehicle (EV) Strategy. To support the electric vehicle ecosystem in Australia, ATSE recommends:

Recommendation 1: Develop a robust electric vehicle strategy that includes both demand and supply-side policies to address electrification of all vehicle segments (buses, trucks, and micro-mobility for public, private, freight and industrial use)

Recommendation 2: Develop policies that ensure increased model availability with clear benchmarks on parts to establish a second-hand market.

Recommendation 3: Include a roadmap for establishing an EV charging network in the National Electric Vehicle Strategy, as well as a plan for fuel cell technologies (like hydrogen-powered vehicles) and their supporting infrastructure, including the establishment of charging standards and a plan for charging networks in regional and rural Australia.

Recommendation 4: Establish a common standard of charging infrastructure including requiring bi-directional power flow.

Recommendation 5: Embed a circular economy approach into the National Electric Vehicle Strategy.

Recommendation 6: As part of the National Electric Vehicle Strategy, invest in upskilling and developing an EV workforce.

Recommendation 7: Implement fuel efficiency standards as part of the National Electric Vehicle Strategy.

Driving a rapid increase in demand for EVs

Providing a comprehensive, national electric vehicle policy will enable uptake from freight, industry, local government, and retail consumers, and encourage manufacturers to diversify supply. This diversity will, in turn, create a competitive market, lowering prices.

Policy mechanisms like fuel efficiency standards and direct financial subsidies are useful tools to increase uptake but need to be coupled with non-financial incentives to accelerate the transition. Non-financial mechanisms like road access privileges, and dedicated free parking create a behavioural incentive for retail consumers to convert to electric vehicles (IEA, 2021).

Demand for EVs is outstripping supply in Australia (Electric Vehicle Council, 2022). Supply-side policies with more direct, sales targets to automakers should be implemented to increase the supply of electric vehicles for Australian retail consumers. In the long run, an increase in supply will increase consumer confidence and mobilise the construction of supporting the use of private, public and industrial EVs via infrastructure and services.

For Australia to meet its net-zero commitments, strategies must also be made for decarbonising all modes of transportation and vehicle segments, including passenger vehicles, freight, public transport, industrial, and micro-mobility[1], must be implemented. While electric (and even hydrogen busses) are being rolled out in major cities around the world as a result of local clean air initiatives, these should be complemented with procurement programs for government fleets, purchasing subsidies for freight, industry and retail consumers, and charging infrastructure to speed up the transition (IEA, 2021).

The national EV strategy should include a plan for fuel cell technologies[2] and vehicles that use this technology. Fuel cell EVs are a compelling solution for heavy-duty and commercial vehicles due to fast refuelling (like internal combustion engines) and high energy density (i.e., lower weight than battery EVs). It is critical to mention in the National Electric Vehicle Strategy that neither fuel cell EVs nor battery EVs should be seen as the only option for transitioning to green energy to power mobility in Australia. Rather, a mix of technologies, along with battery EVs and other new and emerging technologies, would provide the solution to facilitating mobility in a net zero world.

Recommendation 1: Develop a robust electric vehicle strategy that includes both demand and supply-side policies to address electrification of all vehicle segments (buses, trucks, and micro-mobility for public, private, freight and industrial use)

Increasing availability and accessibility of EVs

<u>Second-hand market:</u>

As electric car sales rise, the second-hand market will become an appealing and affordable choice for purchasing an electric vehicle: price is currently a major barrier to uptake. A limiting factor to a strong second-hand market is the decreased performance of an EV's battery which over a period of 10 to 15 years can lose up to 25%-30% of its capacity (Sia-Partners, 2021).

This uncertainty about long-term battery condition raises concerns for buyers and challenges for sellers. The used EV market is in its infancy and does not offer many benchmarks to its participants. Working with the automotive industry to provide clear and standard indicators for this evolving technology will protect consumers in the second-hand market, making electric vehicles more accessible.

Recommendation 2: As part of the National Electric Vehicle Strategy, develop benchmarks on parts and transparency, to establish and support a second-hand market.

[1] It refers to any small, low-speed, human- or electric-powered transportation device, including bicycles, scooters, electric-assist bicycles, electric scooters (e-scooters), and other small, lightweight, wheeled conveyances (Price et al., 2021)

[2] A fuel cell is an electrochemical reactor that converts the chemical energy of a fuel and an oxidant directly to electricity. In the automobile context, fuel cell technologies are used to describe such a reactor using hydrogen or biofuels as the primary source of energy.

Establishing the systems and infrastructure to enable EV uptake

ATSE in its 2019 report Transport Industry Technology Readiness, investigated the infrastructure readiness, skills availability, social readiness, economic and commercial feasibility and policy and regulatory readiness for low and zero-emission vehicles (Australian Academy of Technological Sciences and Engineering, 2019). The report found that the Australian transport sector is least prepared in infrastructure readiness and skills availability for low and zero-emission vehicles. ATSE recommends the following infrastructure issues to be addressed to enable the widespread uptake of EVs:

Charging Infrastructure

As consumers, councils, governments, corporations and other entities make the switch from traditional internal combustion engine vehicles (ICEVs) to EVs, the reliability and maintenance of the supporting electric vehicle infrastructure will become a critical factor in the pace of EV uptake. The current EV hosting capacity[3] in urban and rural charging networks is 40% and 20% respectively (Zhu et al., 2022). This network must be expanded, particularly in rural and regional Australia, to ensure uptake is not limited to city drivers in a retail market.

The development of standard and accessible charging standards will help create economies of scale for both electricity companies and the vehicle industry. It will also help to avoid the risk of waste resulting from stranded assets (charging stations being out-of-date and incompatible with newer vehicles). Common standards will help to ensure the freight and retail driver enjoys a convenient recharging solution across the nation that will avoid a variety of different cables and adaptors and/or retrofit costs for adapting to new charging systems.

Power Supply Infrastructure- Strong uptake of EVs may create energy supply issues - suburban areas could become overloaded with connected chargers, without peak power control of the existing power distribution system. As renewable energy increases there is an expectation that power will become cheaper in times of bright sunlight and high winds, at least until storage becomes more affordable and widespread. Power supply infrastructure will need to adapt to accommodate both renewable sources and increased demand from fast charging.

Recycling Infrastructure- The full life cycle of electric vehicles needs to be considered to avoid creating resource issues while trying to achieve greenhouse gas emissions reduction goals.

ATSE's report 'Towards a Waste-Free Future' highlighted how technology can transform the waste and resource-recovery sector in Australia, and support the transition towards a thriving circular economy (Australian Academy of Technological Sciences and Engineering, 2020). A similar circular approach is necessary for the development of a National EV strategy, to reduce environmental impact and ensure trade-offs are minimised in achieving Australia's climate and emissions commitments. Waste electric vehicle batteries pose challenges in terms of fires and hazardous contamination, and the recovery of resources requires environmentally sound recycling (Baars et al., 2021). Extended producer responsibility in the European Union, and waste management regulations

[3] EV hosting capacity assessment refers to the evaluation of the maximum available capacity of a given charging network to host the EV charging loads up to the point at which the existing system needs to be upgraded. EV hosting capacity is a tool to quantify the impacts of injecting large numbers of EV charging loads and to determine the available capacity of existing distribution to continue providing reliable and affordable electricity grid operations (Paudyal et al., 2021).

in countries including China, Japan, and India, have specifically targeted electric vehicle batteries that have helped with this challenge.

To meet the resource and recycling challenges created by electric vehicles, the management of such vehicles' end-of-life needs must be built into the Strategy. This will require recyclability to be part of the design of EVs and a comprehensive recycling policy with the necessary infrastructure to support it.

Skills to create and support the EV infrastructure- The shift to electric vehicles represents a seismic change for the industry, bringing with it new propulsion technologies and new infrastructure requirements. It also means new opportunities related to how we will build vehicles in the future. Production of EVs will require that the workforce have both traditional skills such as vehicle assembly as well as new skills like electrical equipment assembly. A current and future workforce with training in new processes and production technologies, environment will be needed to meet this challenge. It also provides a unique opportunity to ensure a just and inclusive transition by reducing gender disparities in the automotive ecosystem through training a new diverse workforce (Notarfrancesco, 2021).

Recommendation 3: Include a roadmap for establishing an EV charging network in the National Electric Vehicle Strategy, as well as a plan for fuel cell technologies (like hydrogen-powered vehicles) and their supporting infrastructure, including the establishment of charging standards and a plan for charging networks in regional and rural Australia.

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Utilising fuel efficiency standards to encourage EV uptake

Fuel-economy standards for new automobiles are the key policy lever for reducing the transportation sector's carbon impact in many nations. Fuel efficiency standards are useful because they do not dictate specific technologies but rather set an industry-wide standard. In a competitive market, a manufacturer will offer high fuel-economy automobiles (electric vehicles) at a discount, below marginal cost, whereas low fuel-economy vehicles (automobiles with an internal combustion engine) will face an implicit tax, requiring a price over the vehicle's marginal cost to selling one. In response to the fuel-economy standard, the manufacturer implicitly subsidises high fuel-economy vehicles (electric vehicles and other low-emission vehicles), while implicitly taxing low-fuel-economy vehicles (internal combustion engine vehicles).

By providing incentives to introduce more efficient vehicles and EVs to the Australian market, fuel efficiency requirements could help to reduce transportation emissions and boost the availability of electric and fuel-efficient vehicle models. The current emission intensity[4] for light vehicles for 2021 was 146.5 g/km (National Transport Commission, 2022). A minimum fuel efficiency standard of

[4] Emissions intensity is the grams of carbon dioxide a vehicle may generate per kilometre (g/km) travelled – not the total carbon emissions it generates (National Transport Commission, 2022).

105gCO2/km by 2025 should be achieved which has also been recommended by the Australian Climate Change Authority back in 2014 (Australian Climate Change Authority, 2014).

The development of a strong Australian fuel efficiency standard must be coordinated with the goal of achieving net zero emissions. The National Electric Vehicle Strategy should contain a fuel efficiency standard as well as how these criteria will be regulated and how it will evolve over time. The strategy should include the grace period between the announcement of the standard and the application of penalties (and what these penalties are).

Recommendation 7: Implement fuel efficiency standards as part of the National Electric Vehicle Strategy.

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