SUBMISSION

Submission to the Legislative Council Economy and Infrastructure Committee

Submission to the Inquiry into Electricity Supply for Electric Vehicles

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The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of 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 how to achieve sustainable solutions and advance prosperity.

Electric vehicles (EVs) made up around one in ten new vehicle sales nationally in the first half of 2025 (Whitson 29 July 2025), rising to nearly one in eight vehicles sold in September 2025 (Akhtar 3 October 2025). This is expected to continue rising as national policies, like the Australian Government's Vehicle Efficiency Standard, produce greater choice for consumers and incentives for manufacturers to support EVs. Victoria's Zero Emissions Vehicle Roadmap aims to have 50% of light vehicle sales be EVs by 2030. Despite this progress, EV adoption both nationally and in Victoria remains below other nations. Nearly one in five cars sold worldwide in 2023 was an EV – double the rate in Australia in 2025 (International Energy Agency 2024). Accelerating the roll out of EVs, when paired with green energy, could save 2.3kg of carbon dioxide emissions for every litre of petrol saved (National Transport Commission 2024).

This acceleration of EV uptake can have dramatic ramifications for the electricity grid if not managed properly. AEMO predicts that energy requirements in the two largest energy markets will rise from 1 TWh this financial year to 69 TWh by 2049-50[1] (Australian Energy Market Operator 2025). Yet EVs also provide an opportunity to better manage consumer demand for energy and can contribute to making the most of solar energy generation. The large storage capacity of EV batteries can make EVs more than just appliances drawing from the grid, instead turning them into consumer energy resources that can shift energy demand from times of peak energy consumption to times of peak generation.

To support the roll out of an effective EV power system in Victoria, ATSE makes the following recommendations:

Recommendation 1: Invest in charging technologies to support different use cases with varying charging speeds, to allow for choice for motorists and reduce range anxiety.

Recommendation 2: Support parking facility owners to install charging infrastructure, through incentives and regulation mandates, and install charging infrastructure in all suitable government owned and managed parking facilities.

Recommendation 3: Invest in upgrades to social housing to provide tenants with access to consumer energy resources such as rooftop solar and home battery storage systems, while supporting affordability schemes for lower- and middle-income households, to allow households to shift grid demand when charging EVs.

Recommendation 4: Ensure Victorian energy network operators allow for bi-directional charging for EVs supported by fair tariff structures.

Recommendation 5: Leverage Sustainability Victoria to support the development of EV battery re-use and recycling programs until economies of scale can be established through widespread EV adoption and battery recycling.

Using charging infrastructure to overcome range anxiety

The major concerns of motorists hesitant to switch to EVs are lack of charging, limited EV range and upfront cost to purchase EVs (EY 2023). Upfront purchase costs are already falling, with greater model availability helping to build bring down upfront EV prices. Rebates on car registration in Victoria for EVs further help to reduce ongoing costs. This is reflected in consumer sentiments, with concern over upfront price dropping from 50% in 2021 to 28% in 2023 – leaving range and charger availability as the major factors requiring action. Range is a bigger factor for Victorians in general, with average daily travel being around 73km, compared to 33km nationally (Australian Bureau of Statistics 2020). This makes mitigating range limitations with investments in charging infrastructure more vital in Victoria than other states.

The Victorian Government has already invested $19 million in rolling out charging infrastructure, while the Australian Government recently announced a $40 million investment nation-wide. These investments will help to build consumer confidence and overcome range anxiety, and are needed in advance of motorist demand, to continue to drive adoption.

Not all chargers installed under these programs need to be the fastest possible ultra-fast chargers. Ultra-fast chargers are more expensive to install and usually charge consumers more per kWh used than slower models, making them only ideal in circumstances where the benefit of speed outweighs the additional cost. Instead, a mix of changing speeds could be used to suit individual use cases – making infrastructure more

[1] Under their 'Step Change' scenario.

practical and cheaper for both installers and consumers. For example, ultra-fast charging capability may be needed on major transport routes, fast charging may be needed for destination charging and slower options may be better suited for on-street overnight parking. Common standards and common plugs across these different charging options would ensure interoperability across chargers and vehicles. This roll out may require changes to local government by-laws that prevent curb-side charging, allowing charging on VicRoads land and allowing multiple electricity meters for a single registered address. Allowing chargers to be built directly onto power poles, as is common internationally, may also help to support the roll out of charging infrastructure.

Recommendation 1: Invest in charging technologies to support different use cases with varying charging speeds, to allow for choice for motorists and reduce range anxiety.

Shifting electric vehicle energy demand to stabilise the grid

In an optimal world, increased EV uptake would have no meaningful impact on grid demand. Consumer energy resources, such as rooftop solar, would provide the energy generation required to charge EV batteries. For consumers without at-home solar generation, midday charging would have minimal impact on the grid, as EVs soak up excess solar generation that would otherwise need to be curtailed. Unfortunately, most EV charging occurs in the evening and overnight, when energy production from solar power is low to non-existent. Minimising the grid impact of EVs therefore depends on enabling EV owners to either shift when they charge their vehicles or use consumer energy resources (such as solar and home battery systems) to reduce their reliance on the grid.

Shifting consumer demand to periods of peak generation (usually the middle of the day when solar generation is at its highest) requires a combination of ability and incentives. Energy discounts for charging EVs during the midday generation peak can help encourage motorists who can charge their vehicles at this time to do so. However, not all motorists have the option to charge their vehicles during the middle of the day. Many cars are parked at workplaces, transport hubs or other destinations away from home throughout the day, where charging infrastructure is either non-existent or significantly more expensive than home charging. Low-speed and low-cost chargers (ideally close to home charging costs) at parking facilities for workplaces, shopping centres and transportation hubs could help people to charge vehicles through the midday generation peak. Onsite solar generation at these carparks – through rooftop solar for multistorey facilities or solar supporting sunshades for open air parking – can further reduce the grid impact of EVs charging. Owners of these facilities have so far been slow to roll out this kind of charging capacity – often due to assumptions that ultra-fast charging facilities are needed and that charging facilities would require significant infrastructure upgrades – meaning a mix of incentives and regulatory mechanisms may be needed to facilitate increased uptake of these charging facilities and supporting consumer energy resources.

Moving when motorists charge their vehicles is one method of shifting demand on the grid; another involves using consumer energy resources to make this shift without behavioural changes. ATSE recently produced an explainer on managing energy demand that covers technologies than can support households and businesses to reduce or shift grid demand. For example, homes with rooftop solar and battery systems can allow energy to be collected during the day and used in the evenings when demand for energy usually peaks. These technologies, while falling in price over recent years, remain out of reach of the people they would most benefit – social housing tenants and low socio-economic status individuals. Supporting these people to reduce or eliminate the upfront cost of installing these technologies – through social housing upgrades, interest-free loans or post-installation payment schemes[2] – will help manage grid demand from EV charging. At the same time, subsidies for consumer energy resources for middle income households[3] can help increase EV adoption for those households.

Recommendation 2: Support parking facility owners to install charging infrastructure, through incentives and regulation mandates, and install charging infrastructure in all suitable government owned and managed parking facilities.

Recommendation 3: Invest in upgrades to social housing to provide tenants with access to consumer energy resources such as rooftop solar and home battery storage systems, while supporting affordability

[2] Which can allow consumers to pay back the cost of the installation using savings from their energy bills.
[3] Like the solar panel rebate and the previous solar battery loans through Solar Victoria.

schemes for lower- and middle-income households, to allow households to shift grid demand when charging EVs.

Using electric vehicles as energy storage

The growing potential of bidirectional charging (vehicle-to-grid or vehicle-to-home) technology can also allow EVs to support grid stability. A typical EV battery holds three times the daily energy usage of an average household and usually holds significantly more energy than is needed for an average trip. By enabling EVs to discharge excess stored energy back into the grid or into homes during peak periods, EV batteries can act as distributed energy storage – supporting grid stability and security and bringing down overall energy prices. This requires two factors – tariff structures that incentivise this behaviour and technical capacity to support bidirectional charging. Tariff structures would ideally allow EV owners to buy electricity at cheap prices during peak generation and sell it back to the grid for a small profit during periods of peak demand or provide a general energy discount for allowing an EV battery to be used to support the broader grid. This will incentivise EV owners to use their EV batteries to support grid stability and invest in bidirectional charging technology, which usually has a higher upfront cost than unidirectional chargers.

While several EV models are equipped for bidirectional charging, Victorian energy distributors have yet to adopt this technology. No providers currently allow bidirectional grid connections for EVs in Victoria. Recent updates to standards and the development of technical and regulatory frameworks in other states have allowed three network operators in other states to adopt bidirectional charging[4]. Victoria. Getting Victorian network operators to allow such connections and establish appropriate tariff structures is necessary to allow the state to take advantage of this emerging technology. This will require technical and regulatory frameworks, as well as network operators opting in to supporting this technology.

Recommendation 4: Ensure Victorian energy network operators allow for bi-directional charging for EVs supported by fair tariff structures and an appropriate regulatory framework.

Managing battery waste

Reusing and recycling EV batteries at the end of their lifespan can divert significant amounts of waste from landfill and will only become more important as EVs become more popular. EV batteries often have much larger capacity than standard home storage systems[5]. This means that vehicle batteries that can only hold half of their original charge could still provide more storage than a standard home battery system. Nickel-metal hydride batteries (used in many hybrid vehicles) are already being re-conditioned, but lithium-ion batteries can be complex to safely recondition. Infinitev, which is partnering with Sustainability Victoria, has been developing reuse options including as power back-up systems and reducing peaking power, aiming to extend battery life by up to 10 years (Sustainability Victoria 2023).

Where reuse or repurposing is no longer possible, recycling EV batteries is the next best option. EV batteries contain up to 20 different elements that can be recovered, including nickel, manganese, cobalt and lithium – 97% of which are recyclable (Hagon October 2024). Victoria is already a leader in battery waste recycling. Livium runs a facility in Melbourne that discharges, dismantles and recovers materials from lithium-ion batteries. This facility has diverted over 1 million kilograms of batteries, including over 2500 EV batteries, from landfill to date. Low volumes of batteries at present, however, make a widespread recycling industry less economic. This will likely change as greater volumes of batteries reach the end of their lifespan, helping to build new industries in a circular economy. Investing in reuse and recycling infrastructure helps to make these industries more economically feasible and helps to support scaling up as demand increases (ATSE 2020). Sustainability Victoria provides a great avenue to support these emerging reuse and recycling facilities until economies of scale are established that make a widespread circular economy for EV batteries economically viable.

[4] As of July this year, there were three providers nationwide: SA Power Networks, Essential Energy and Ausgrid (Fisk 2 July 2025).
[5] An EV battery that stores 40kWh is considered relatively small, while household batteries have a typical capacity of 4kWh to 14kWh (Hagon October 2024; DCCEEW 2025).

Recommendation 5: Leverage Sustainability Victoria to support the development of EV battery re-use and recycling programs until economies of scale can be established through widespread EV adoption and battery recycling.

ATSE thanks the Legislative Council Economy and Infrastructure Committee for the opportunity to respond to the Inquiry into Electricity Supply for Electric Vehicles. For further information, please contact academypolicyteam@atse.org.au.

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