Institute for Energy Economics and Financial Analysis
ieefa.org

91 Percy Street
Warwick, QLD 4370
aus_staff@ieefa.org

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To: Committee Secretary
RE: Inquiry into the transition to electric vehicles

Thank you for the opportunity for the Institute for Energy Economics and Financial Analysis (IEEFA) to provide input on Inquiry into the transition to electric vehicles. IEEFA is an energy finance think tank that examines issues related to energy markets, trends, and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy.

Australia has a huge economic opportunity to reduce its dependence on imported fossil fuels by transitioning to electric vehicles, powered by locally produced, largely renewable energy. Transitioning to EVs can result in lower emissions and lower energy costs for Australians, improving Australia's energy security and reducing Australia's exposure to international fossil fuel price volatility.

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

Electric vehicles have cheaper running costs than ICE vehicles. CSIRO found that households that own an EV could benefit from savings of $1440 a year by 2030.[1] Transport for NSW estimated that EVs lead to fuel savings of up to 70% and maintenance savings of about 40%.[2] A large part of the maintenance savings are because EVs have fewer moving parts than a petrol or diesel car, so have lower servicing costs.[3] A large part of the fuel savings come from the fact that EVs are more efficient at converting energy to motion than ICE vehicles: figures from the NREL in the US indicate that EVs are 4.4 times more efficient than ICE vehicles.[4]

Australia has abundant, low-cost solar energy resources. The best way for consumers to save money on their power bills while using EVs is by charging their EVs with low-cost rooftop solar. This reduces consumer imports from the grid, reducing energy bills. Plenti and Accenture found that, "if EV owners install a solar and battery system, they can limit the household electricity costs to around $230 a year."[5] This is an extremely low cost.

The impact on electricity consumption and demand*, and energy bill savings*

Electric vehicles are essentially a large "battery on wheels". EVs can complement a renewables-based power system by storing variable renewable energy and using it to power vehicles or other loads at different times of the day, reducing the reliance on higher-cost and higher-emissions electricity generated from coal or gas.

EVs are anticipated to change the shape of power demand, which can reduce energy costs for consumers overall. CSIRO found that there are $500pa of benefits for all consumers arising from EV uptake by 2050, regardless of if the consumer owns an EV or not. These benefits arise by managing EV energy consumption to avoid adding to peak demand, which can result in reduced network,

[1] CSIRO. Consumer impacts of the energy transition: modelling. July 2023. Page vi.
[2] Transport for NSW. Why buy an Electric Vehicle? Accessed 14 March 2024.
[3] Ibid.
[4] US National Renewable Energy Laboratory (NREL). Electric Vehicle Efficiency Ratios for Light-Duty Vehicles Registered in the United States. March 2023. Page v.
[5] Plenti and Accenture. Solar charged EVs in Australia. March 2022. Page 3.

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generation and storage expenditure. The EV consumption would increase the utilisation of the networks, acting to reduce energy unit costs that networks need to recover from each customer. [6]

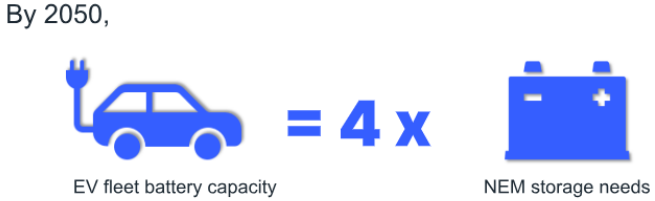
Most EVs have unidirectional (one-way) charging capability. However, if two-way (bidirectional) charging is available and consumers take up this technology, significantly greater economic opportunities are on offer for Australia.

EVs with two-way charging capability can not only import from the grid, storing renewable power and powering vehicles with it, but they can also export that energy back to a building, load or the grid. Electric vehicles with "vehicle-to-everything" (V2X) capability can export power from the vehicle battery to power a home or building (V2H or V2B), to power the grid (V2G), or to directly power an electrical appliance (V2L). This can help enhance energy system security. It could also provide financial benefits for those who own the EVs and reduce the need for large-scale storage build.

A household with an EV that has V2X functionality could make money from exporting to the grid if the standards, market settings and regulatory landscape allow for this. Studies indicate the revenue for households could be $1,000 to $3,700 a year.[7]

The EVs with V2X functionality could help fortify the energy system by providing valuable storage capacity. EnX estimates that by 2050 the total battery capacity in the EV fleet would be about four times the NEM's total storage requirement.[8] "Flexible bidirectional charging (Vehicle to grid) from only 10% of EVs could provide 37% of total NEM storage needs, offsetting around $94 billion of large-scale battery storage investment (at current prices)".[9]

EV fleet capacity forecast to have more storage capacity than the NEM's requirements



Source: enX

NERA economic consulting has modelled the economic benefits arising from flexible charging/ discharging of EVs in a high EV uptake world. They modelled EV flexibility in the system in two ways:

- Deferred charging – i.e. charging an EV at a different time than it usually would (such as charging before or after peak demand periods instead of peak demand periods) and;
- V2G – "where an EV uses its actual battery to discharge to the grid, to be recharged later."[10]

NERA found that, "More flexible EV charging has a low marginal cost and delivers savings to consumers between $3-5 billion."[11]

To access the potential benefits on offer arising from EVs, quantified by CSIRO, NERA and enX, Australia desperately needs an EV-grid integration strategy to ensure we are charging up EVs at the times of the day when we have abundant renewable power, and helping deliver energy to households,

[6] CSIRO. Consumer impacts of the energy transition: modelling. July 2023. Page 26.
[7] IEEFA. Submission to the New Vehicle Efficiency Standard consultation. 1 March 2024.
[8] enX. V2X.au Summary Report – Opportunities and Challenges for Bidirectional Charging in Australia. 2023. Page 3.
[9] Ibid..
[10] NERA Economic Consulting. Valuing Load Flexibility in the NEM. 1 February 2022. Page 17.
[11] ARENA. Load Flexibility Study Technical Summary. April 2022. Page 11.

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businesses and the grid when it is most needed (by using V2X functionality). We don't have the policy, standards and regulations in place to enable V2X in Australia. This should be a focus, to enable Australia to access the significant benefits on offer from EVs.

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

As outlined in our submission to the New Vehicle Efficiency Standard consultation, we need to undertake the following actions to access the range of benefits on offer from EVs:

- *"Development of an EV-grid integration plan;*
- *Establishment of a body to set CER technical standards, including demand response requirements for EV chargers;*[12]
- *Removal of static limits on household energy exports in favour of dynamic operating envelopes and;*
- *Commissioning a thorough, independent review of distribution network revenue regulation to ensure the regulation supports the integration of DER including EVs."*[13]

These actions should all have regard to the significant opportunities arising from V2X.

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

The government and industry should focus on developing a responsible, ethical, resilient EV supply chain to deliver bidirectional charging EVs to Australian homes and businesses. Focus should also be on how to sustainably generate the most value from Australia's abundant critical minerals in the global transition to EVs.

The impact of Australia's limited EV supply compared to peer countries, and any other relevant matters

The share of EVs in Australia's vehicle market is well below the global average.[14] Australia's limited EV supply compared with other countries is limiting consumer access to lower cost forms of transport, limiting Australia's ability to quickly reduce transport emissions, and limiting Australia's ability to access the economic and energy security benefits arising from EVs.

IEEFA encourages the government and energy industry to develop the systems and infrastructure needed to ensure Australia can access the significant economic benefits on offer from the global transition to EVs.

Kind regards,

Johanna Bowyer, Lead Analyst – Australian Electricity, IEEFA

Jay Gordon, Energy Finance Analyst – Australian Electricity, IEEFA

[12] See also: IEEFA. Mandating AS4755 Ignores Households and Widely Supported International Solutions. August 2021.
[13] IEEFA. Submission to the New Vehicle Efficiency Standard consultation. 1 March 2024.
[14] Electric Vehicle Council. State of Electric Vehicles. July 2023. Page 9.