

Summary

We simply need to make an easy choice: the fossil fuel burning wasteful polluting vehicles versus clean energy efficient cars.

The electric car is the answer to our future transport needs, but there is still a lot of development that can be implemented. This will be a unique Australian experience and I believe the technology and capability available to us to start our own EV industry is proven. The difference between success and failure in this enterprise will lay in the capabilities and attitudes of individuals engaged. We should not underestimate, the culture of Australian society and industry sectors we should seek funding opportunities from all areas, from companies/organisations and ask all Australians to invest either financially, with their time/labour or by simply purchasing a vehicle or associated tech products. Through government involvement in Strategic planning and support to an Australian manufactured EV, answers to key problems can be made that individual companies will be unable to find on their own.

A Comparison between EVs and standard Combustion Vehicles

Internal Combustion Vehicle (ICV)

- **More bang:** Petrochemicals are controlled explosions that deliver a large force for a small amount of fuel and subsequently less weight in comparison to current batteries. There is less inertia to overcome when accelerating.
- **Wasted energy:** There is no way to apply the vehicle's latent momentum back into a force that can be reutilised to further accelerate without adding significant weight to the vehicle defeating the advantages of that regeneration.
- **Mass distribution and wasted weight.** Two large mass centres: the fuel tank and engine. A heavy drive train and chassis are required to support these mass structures.
- **Air pollution:** ICVs exhaust a mixture of gases and ions that cause harm to the environment and in sufficient concentrations harm to humans directly.
- **Refuelling:** Refuelling can be achieved quickly as we have constructed an industry around providing fuel to these vehicles at various places of convenience.
- **Hazardous chemical risk:** Petrol stations are an environmental risk and a safety hazard requiring bulk storage of explosive toxic fuels.
- **Range:** Petrol fuelled vehicles have a range of 400 – 600km. ¹

¹ Why are the average ranges for cars, electric (newer) or gas, always around 300–400 miles?
<https://www.quora.com/Why-are-the-average-ranges-for-cars-electric-newer-or-gas-always-around-300%E2%80%93400-miles>

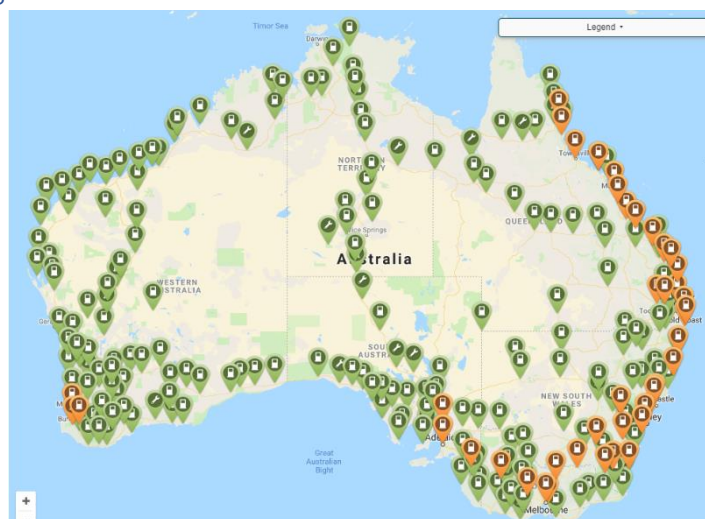
Battery Electric Vehicle (BEV)

- **Mass distribution:** Wheels can be driven directly with a motor at each wheel or the wheel can be the motor. The advantages of smaller masses at motor locations, where maximum force is required, allow for more freedom of design, lower centres of gravity and better handling opportunities. Flexibility in weight distribution also allows for more safety features to be built into the overall design.
- **Energy conservation:** Power can be regenerated using the vehicle's latent momentum during braking.
- **Refuelling depots:** Refuelling depots can be set up almost anywhere at low cost and can be easily utilised without the need for monitoring.
- **Induction recharging:** Vehicles can simply be parked over induction pads or even recharged on the move. No hazardous chemical storage required.
- **Car mass:** Most of the weight will be in the battery with better more efficient batteries currently being developed.
- **More space in the interior:** Without the two large masses present in ICVs, different designs can be constructed to utilise the space more effectively.
- **Solar panelling:** If stranded in remote areas, solar panels mounted in the car body allow for the vehicle to be recharged.
- **Vehicle emissions:** There are no gas emissions and low noise emissions in a BEV.
- **Battery storage grid return:** Currently, there are 18 million motor cars all over Australia. If these were electric vehicles, you would have the most widespread mobile power storage in the world.

Current national power generation i.e. coal/gas	200-Terawatt per hour ²
Power return from stored EV car batteries	6375-Terawatt per hour
Based on 85kw storage per MV X 18 Million EV take up vs ICV (efficiency gains with shorter transmission distances not included)	

- **Range:** BEVs can have a range of 450km.
- **Fast charge:** currently 1 hour for 450km of range but with minimal development could be equivalent to that of petrol vehicles.

National charging locations in Australia³



² National Electricity Market Fact Sheet <https://www.aemo.com.au/-/media/Files/Electricity/NEM/National-Electricity-Market-Fact-Sheet.pdf>

³ Tesla electric car owners release round Australia charging station map

<https://www.energymatters.com.au/renewable-news/tesla-car-australia-ev-charging-station-map/>

Government and industry supporting the electric car

The electric car can be a catalyst for a multitude of industry opportunities creating wealth through jobs and marketing leading products. These are a few examples of industries potentially involved along with how government support could benefit.

Industry	Industry types	Benefit of Government organisation
Traffic control / Main roads authorities	State run organisation that monitors traffic and related vehicle issues with roadways	New tracking/navigation technology, batteries and safety systems can be put into our own electric cars. at locations to serve the most traffic. This authority can monitor safety and flow as well as control of charge to grid operations
Research and development	Private and government organisations and companies that investigate, analyse and find answers to needs or create new opportunities in industry	A holistic approach to all aspects of creating the motor vehicle tying together other opportunities of utilising the same technology and systems in different areas of industry and other countries
Design	vehicle, engineering, materials, electronic, systems	Strategic/ planning support funding and regulation/ standards.
Vehicle charging stations	Fast charge, Private, in building and public facilities	Strategic/ planning support funding
Solar generation	large scale and small	Strategic/ planning support funding
Electrical	infrastructure, network infrastructure construction, installation and maintenance, automotive electrics.	Training programs support, regulation and standards Strategic/ planning support funding
Manufacturing	Metal fabrication, plastics, glass and specialist material, and component manufacture	These industries already have experience in the automotive industry. With a government backed automotive manufacturer they will thrive again

The Australian advantage

- We are the largest Lithium producer in the world.
- Our existing car manufacturing industry has wound down leaving a group of companies and skilled professionals set up to produce motor vehicles looking for new opportunities.
- Australians are incredibly creative and innovative thanks to an open minded cultural dynamic.
- Given the current trade environment, if we take the plunge we can lead the world with the development of long range and robust electric vehicles. We have the perfect environment to test the utility of a variety of vehicle types.
- Plenty of sun and open ground to help tie renewable electricity generation to the electric car.

The Australian Advantage (cont.)

- Electric car charging stations can also be used to feed the charge from batteries back into the grid. This resource controlled effectively can be used as a backup in cases of large plant generation failure and load balancing on the grid to help feed stored renewable generated power back into the grid at night.
- We live in an age where we can put thousands of small low cost innovative ideas into one project and, once proven in the EV, these can be utilised in other areas. For example, the development of flexible or moulded solar panelling can then be incorporated into other areas of construction and technology.

Conclusion

This submission is the tip of the iceberg. I have been working with innovative people all my life looking for an outlet to make a difference in this country. This is our best opportunity to lead the world into a new era and make Australia great.

Recommendations

We are asking Australians to invest in our future.

- 1) Start with marketing on multiple fronts.
 - a) Promote the project as being one that will involve all Australians at some level.
 - b) Promote the vehicle as state of the art: faster acceleration, no emissions, and quiet.
 - c) Ask for expressions of interest, for funding/investment, employment, and to bid on manufacturing and material supply.
 - d) Ask for design and technology proposals - make it a competition. Who will design the next generation of Australian motor vehicles?
- 2) Build a small team with crossover skill sets to analyse and report on options/requirements we might have.
 - a) Choose a state and location for a manufacturing plant.
 - b) Set time frame, goals, budgets, and procure resources.
 - c) Utilise Australia's best minds on it - make sure they represent a good cross section of expertise, age, cultural mix. Poll a larger group to test strategic direction and/or seek expert input.
 - d) Build a wider team to support administration, monitoring progress, reporting and marketing.
 - e) Re-adjust time frame, goals, budgets, and resource procurement based on renewed evaluation.

Additional References

Adlittle assessment: Battery Electric Vehicles vs. Internal Combustion Engine Vehicles

http://www.adlittle.de/sites/default/files/viewpoints/ADL_BEVs_vs_ICEVs_FINAL_November_292016.pdf