

MEDIA RELEASE: ABMARC RELEASES KEY FINDINGS FROM THEIR ELECTRIC & HYBRID VEHICLES REPORT.



COMPLETE ANALYSIS TOOLS



Global

Key country analysis, policies, vehicle trends
Materials & resource investigations



Australia

Market research (technical surveys), geospatial mapping
Modelling and forecasting



Technology

Technology analysis and forecasting
Vehicle or technology testing & evaluations

Melbourne, Australia –15th October 2012: The third report in the Powertrain Series, Electric & Hybrid Vehicles Australia: An Automotive Perspective, combining in-depth technical analysis with market research, identifies what the future holds for electric and hybrid vehicles in Australia.

ABMARC is the authoritative source for unbiased and comprehensive analysis of conventional and alternative powertrains, energy, transport and fuels.

Fast Facts from the ABMARC Electric & Hybrid Vehicle Survey:

ABMARC conducted a survey of more than 640 motorists to understand their knowledge of, attitudes towards, and future purchase considerations of electric and hybrid vehicles. Some of the key results show that:

- » Of current vehicle ownership, hybrid vehicle owners reported the best experience with 88% describing it as 'great!' (this compared to petrol vehicle owners at only 29%)
- » Motorists who would consider buying an electric car (EV) are more likely: to be male and live in the inner city, hold a university degree and presently own a hybrid vehicle
- » Only 51% of respondents had a convenient recharge point at their home and this number decreased dramatically for those motorists living in the inner city
- » Regarding future purchase consideration, 22% of respondents said they 'would definitely consider a hybrid' and this was split almost equally between men and women.
- » This contrasted to only 2% of respondents definitely considering an electric car at a \$15,000 price premium (over an equivalent petrol vehicle) with many citing range or price of the EV as a concern

Natalie Roberts, Principal Engineer at ABMARC, said in summary the research shows that "Whilst it is likely that in the short to mid-term, electric cars will fill a niche in the market, there will be large growth in hybrid vehicle sales. This will be driven by an increasing line-up of available models, positive customer experiences and a decreasing price differential to an equivalent petrol car. In 2020, the hybrid (including plug-in hybrid electric vehicle (PHEV)) will no longer be an 'alternative' vehicle type, but the vehicle of choice for a large number of Australian motorists."

"Manufacturers are increasingly likely to choose hybrid technologies to meet mandatory CO₂ reduction targets, as they don't require additional investment in refuelling infrastructure, and are therefore more 'global' in platform design, which is important to keep R&D and production costs down. Our forecasts show sales growing strongly in the hybrid and plug-in hybrid electric vehicle segments over the next 8 years to a combined 6.4% of the new vehicle market in Australia."

Regarding electric vehicles, Ms. Roberts says that some of the challenges for their uptake are because "Australia presently has no Federal government incentives for the promotion of electric vehicles. Without these, it is unlikely that there will be a significant uptake of electric cars to 2020 unless there is a breakthrough in battery technology to decrease the price and increase the range. With current trends and policy settings, EVs may constitute only 0.4% of new vehicle sales in 2020."

"Additionally, the makeup of Australia's power generation, mainly based on the burning of fossil fuels, does not always lend itself to a 'greener' outcome when using electric or plug-in hybrid electric vehicles. To ensure a cleaner outcome when operating plug in vehicles, consumers must purchase, at an additional cost, 'green' electricity. The price of electricity compared to petrol is high in Australia, and has increased further due to the carbon tax and the underlying annual price growth. This makes the payback period of an electric or plug-in hybrid vehicle longer than in most other countries."

That being said, Ms Roberts also emphasised that "It should be noted that electric vehicles represent a dedicated commitment to improving vehicle technology, and offer their target market, vehicles that cannot be matched by conventional petrol or diesel cars in terms of exceptional drivability and NVH (noise, vibration, harshness) performance – and they are fun to drive!"

Phone Natalie Roberts, Principal Engineer on 03 5964 8402, mobile 0438 352 530, email on nroberts@abmarc.com.au for further information, or see over page Natalie Roberts' article on an analysis of what the future holds for electric and hybrid vehicles. The full report is available for sale in .pdf and hardcopy format for \$825.00

ELECTRIC & HYBRID VEHICLES

An examination of the factors driving the development and uptake of electric and hybrid vehicles and analysis of what the future may hold.

Drawing on key findings from the latest report in the Powertrain Series, **Electric & Hybrid Vehicles Australia: An Automotive Perspective**, Natalie Roberts, the Principal Engineer at ABMARC provides a view of the future of Electric and Hybrid vehicles in Australia.

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There is much media coverage and excitement surrounding the emergence of electric (and to a lesser degree) hybrid vehicles into global markets – but what really does the future hold for these cars and is it likely that you will have one parked in your garage any time soon?

TECHNOLOGY OVERVIEW

Before delving deeper into a discussion on the future of electric and hybrid vehicles, it's important to first make sure that we are using common terminology, and have a good understanding of the different vehicle types.

Motor – A device that converts electrical energy into mechanical work

Engine – A device that converts heat energy (such as that produced when combusting fuel) into mechanical work

Hybrid – Combination of two or more device types





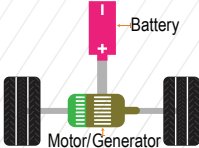
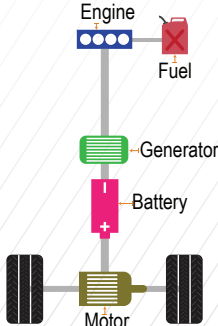
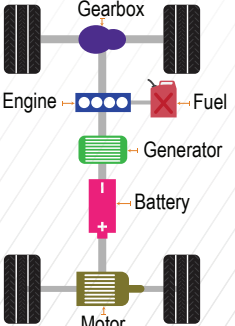
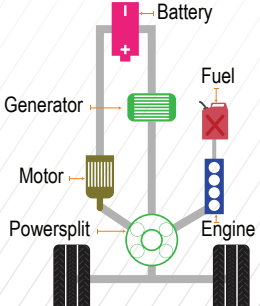
Powertrain – Propulsion system (such as engine, motor or combination of the two) and transmission

All electric vehicles (EVs) and hybrids require their batteries to be charged with electricity. This electricity comes from the electricity network (the grid) in the case of EVs, or from an on-board generator in the case of hybrids.

The on-board generator converts energy that would normally be lost as heat when the vehicle is slowing down or braking, into electricity and stores this in the battery. The vehicle then utilises this 'stored' energy to assist in propelling the vehicle. In doing so, a hybrid car can offer improved efficiencies (better fuel economy and lower CO2 emissions) over a conventional petrol vehicle of around 30%.

To add additional complexity, a newer type of hybrid can also accept charging from the grid (this type is likely to become more popular in the future). A hybrid vehicle that is capable of grid charging is known as a plug-in hybrid electric vehicle (PHEV).

There are three key types of hybrid vehicle systems, being: series (example – the Fisker), parallel (example – Honda Integrated Power Assist) and powersplit (example – Toyota Hybrid Synergy Drive). Manufacturers will select a petrol, diesel or LPG fuelled engine as the primary propulsion source.

Electric 	Hybrid 		
	 AVAILABLE ON SOME HYBRID VEHICLES - If it is possible to plug in and charge a hybrid vehicle from the "grid", it is then known as a Plug-in Hybrid Electric Vehicle (PHEV)		
Full Electric	Series Hybrid	Parallel Hybrid	Powersplit Hybrid
			
A full electric vehicle comprises a battery and motor/generator only	In a series hybrid, the engine provides charge to the battery and an electric motor drives the vehicle	The engine and motor work together to provide drive traction to the wheels.	Both the engine and motor can provide drive effort to the wheels, either together or independently through the powersplit device.

For Illustration Purposes Only. Source: ABMARC

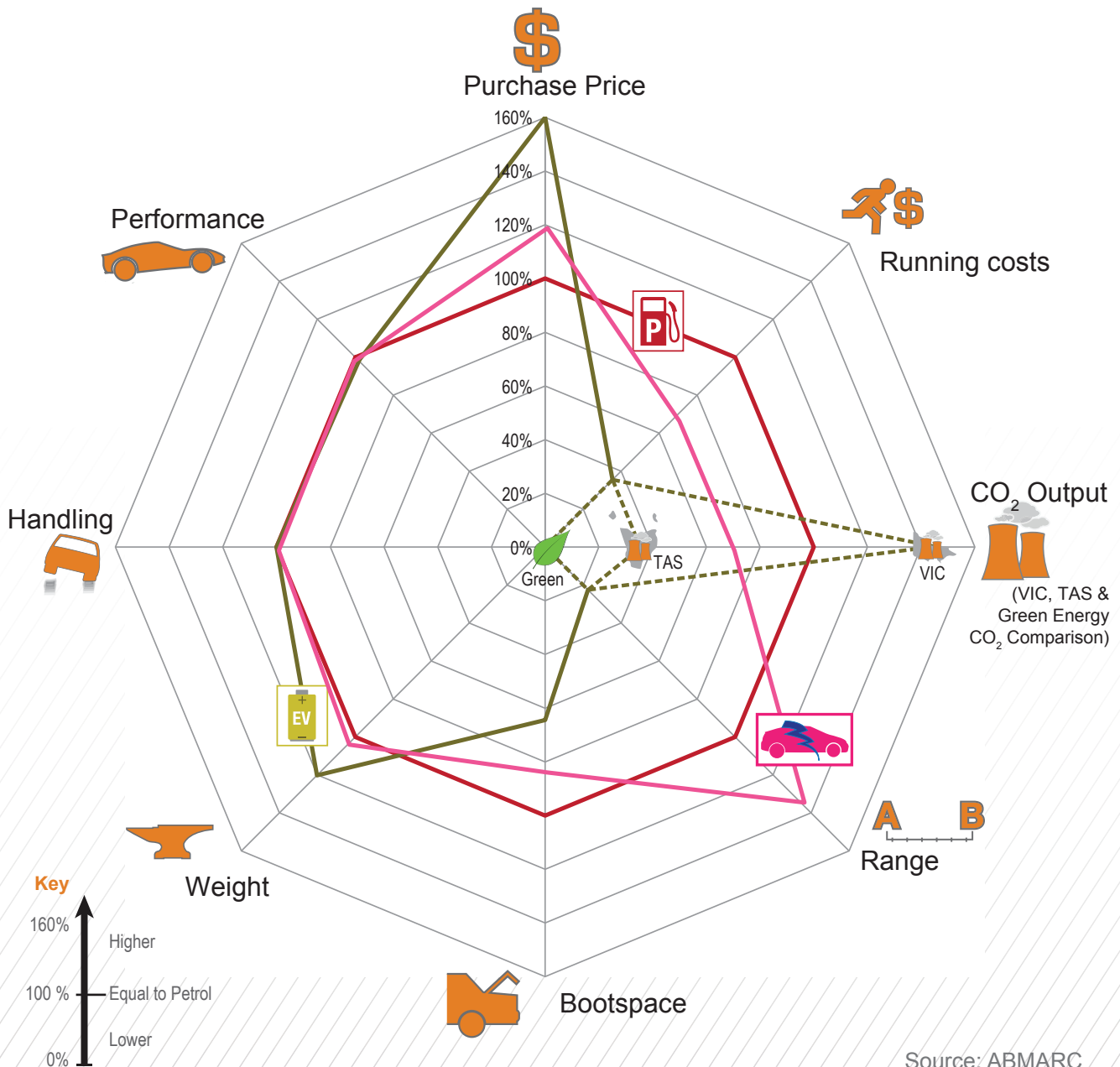
Due to the multiple hybrid system types, and the various marketing strategies used by vehicle manufacturers, a large number of motorists are unsure about what technologies exist and how each of the different technologies works. One of the common themes raised by motorists in the ABMARC electric and hybrid vehicle survey was that they found the topic 'confusing'. This confusion will be further compounded by the motorist's vehicle choice no longer being just a matter of 'petrol versus diesel', but also a range of full electric or hybrid series, parallel, powersplit and potentially any of the hybrids with 'plug-in' capability.

VEHICLE EVALUATION & COMPARATIVE ANALYSIS

As part of the Electric & Hybrid Vehicle report, ABMARC conducted a comprehensive comparative analysis and technical evaluation of five vehicles. Whilst all vehicles scored well in the evaluation for drivability, and proved themselves to be capable performers on the road, some key features of the two electric vehicles may not meet the expectations of most drivers in terms of the price premium over a comparative petrol car and the range.

It should be noted however, that electric vehicles represent a dedicated commitment to improving vehicle technology, and offer their target market, vehicles that cannot be matched by conventional petrol or diesel cars in terms of exceptional drivability and NVH (noise, vibration, harshness) performance.

Looking at the key comparison chart of typical vehicle characteristics, it is clear the hybrid car presents a much more compelling story for the motorist than EVs do across features such as range, price, weight and bootspace.



Of the cars evaluated, the Holden Volt (marketed by GM as a 'range extender' but considered a plug-in hybrid by our definitions) was the leader in our assessment. Whilst it may have been the most expensive, the Volt was the most drivable, with the best performance and the most advanced interior. More than any other vehicle tested – the Volt made you feel as if you were driving the "next generation" in vehicle design.

It is our view that the hybrid operating strategy adopted in the Honda Insight (one of our evaluation vehicles) is moving in the right direction with regards to making hybrid technology affordable, pairing a small motor with the engine to improve overall efficiency. This also has the benefit of utilising a smaller battery than other hybrid vehicle architectures. A smaller motor and battery result in lower costs, less intrusion on interior space to accommodate the technology, and less overall additional weight.

POLICIES INFLUENCING CHANGE

Instead of motorists driving the trend towards electric and hybrid vehicles, it is actually being propelled mostly by government policies and regulation. The USA, Europe and Japan are encouraging new technologies through a combination of more stringent vehicle emission standards, tougher fleet average CO₂ or fuel economy reduction targets and the linking of research and development (R&D) grants provided to automotive manufacturers and suppliers to the investment in, and production of 'green' technologies and vehicles.

To reduce the CO₂ emissions of a vehicle, there are two fundamental approaches that can be taken. The first is to increase the powertrain efficiency – as is the case with hybrid or diesel technologies (and EVs, although this is dependent on the source emissions of the power generator); the second is to use lower carbon fuels such as LPG, CNG (compressed natural gas) or biofuels (that have a 'net' CO₂ benefit).

Manufacturers are increasingly likely to choose hybrid technologies as they don't require additional investment in refuelling infrastructure, and are therefore more 'global' in platform design, (which is important to keep R&D and production costs down). Importantly, hybrid vehicles provide fewer compromises for the owner when compared to some other alternatives.

These global government policies have had a direct impact on the model line-up of all the major automotive manufacturers, who have responded with more fuel efficient vehicles. For example, today in the USA there are 15 electric, 3 plug-in hybrid and 38 hybrid vehicle models available – with a growing number planned for release in the coming years. With greater choice, the hybrid car will continue to grow in popularity and will soon no longer be an 'alternative' vehicle but a mainstream type. As an example, in Japan, hybrid cars now account for 9% of all new vehicles sold, and sales are on target to reach 20% by 2020.

Regarding EVs, many governments, particularly in Europe have set ambitious targets for their adoption. Some of these plans have been accompanied by significant subsidies (such as €7,000 in France) for the purchase of new electric vehicles. Despite this, the uptake by consumers has been well below expectations. EV sales are currently well below both manufacturer and government hopes and it is likely that the optimistic targets for their mass adoption will not be met. An additional challenge for electric cars is that they are chasing a moving target – with advances in petrol and diesel technologies resulting in more efficient and powerful engines every year (efficiencies that hybrid cars are able to capitalise on).

THE TREND IN AUSTRALIA

Presently, Australia has no Federal government incentives for the promotion of electric and hybrid vehicles. Without these, it is unlikely that there will be a significant uptake of electric cars to 2020 unless there is a breakthrough in battery technology. ABMARC forecasting shows that with current trends and policy settings, EVs may constitute only 0.4% of new vehicle sales in 2020.

Additionally, the makeup of Australia's power generation, mainly based on the burning of fossil fuels, does not always lend itself to a 'greener' outcome when using electric or plug-in hybrid electric vehicles. To ensure a cleaner outcome when operating plug in vehicles, consumers can purchase 'green' electricity, but this will be at an additional cost. The price of electricity compared to petrol is high in Australia, and has increased further due to the carbon tax and the underlying annual price growth. This makes the payback period of an electric or plug-in hybrid vehicle longer than in most other countries.

The growth in hybrid (including PHEV) sales however, is expected to be quite dramatic to 2020. ABMARC forecasts sales to grow strongly in this segment over the next 8 years to a combined 6.4% of the new vehicle market.

Key results of future buying consideration from the ABMARC Electric & Hybrid vehicle survey, conducted exclusively for the report, shows that 22% of Australian motorists would definitely consider a hybrid car for their next vehicle purchase – this compared to only 2% considering an EV at a purchase price premium of \$15,000, with many citing

range or price of the EV as a concern. Of note, the survey identified that current hybrid vehicle owners loved their cars, with 88% reporting a 'great' experience (this compared to petrol vehicle owners at only 29%). Hybrid owners were much more likely than the other respondents to consider the purchase of both an electric or hybrid vehicle in the future.

IN CONCLUSION

Whilst it is likely that in the short to mid-term, electric cars will fill only a niche in the market, there will be large growth in hybrid vehicle sales – driven by the increasing line-up of models available, positive customer experiences and a decreasing price differential to an equivalent petrol car. In 2020, the hybrid (including PHEV) will no longer be an 'alternative' vehicle type, but the vehicle of choice for a large number of Australian motorists.