

BRIEFING PAPER

HYBRID AND BATTERY ELECTRIC VEHICLE COMPARISON



INTRODUCTION

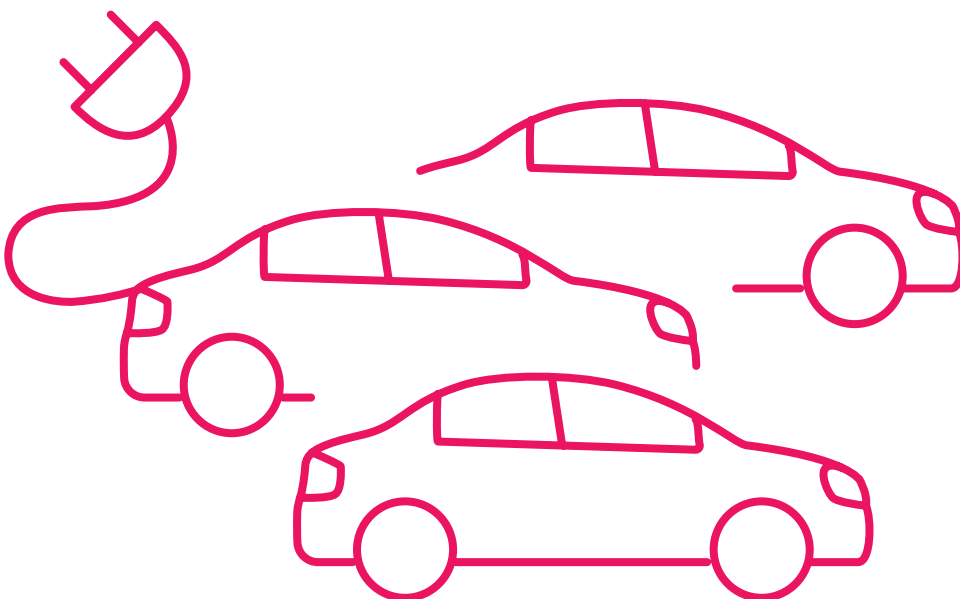
Australians want to buy the best car that suits their budget - one that is affordable to run, safe and clean. Introducing strong fuel efficiency standards will mean Australians gain access to a much wider range of lower and zero emissions vehicle options. These cars are already for sale at affordable prices in many places around the world, but we don't currently have them here.

To save Australians money at the petrol pump while driving down the harmful carbon pollution our cars produce, our policy settings should prioritise the cleanest affordable vehicles available. Battery electric vehicles are not only price competitive with hybrid electric vehicles now, but are also cheaper to run and cleaner.

📊 BACKGROUND: WHAT ARE FUEL EFFICIENCY STANDARDS?

Fuel efficiency standards aim to limit the greenhouse gas emissions Australia's cars release by setting a yearly limit on the average carbon emissions across a manufacturer's new car sales. Over time, the maximum amount of carbon dioxide (CO₂) that can be emitted is reduced, which means car makers must offer more new low and zero emissions vehicles to avoid penalties.

Fuel efficiency standards already cover over 85% of the global car market. Australia, alongside Russia, is one of the few wealthy countries without these standards putting a limit on how much CO₂ our new cars can produce.



NOT ALL ELECTRIC VEHICLES ARE CREATED EQUAL

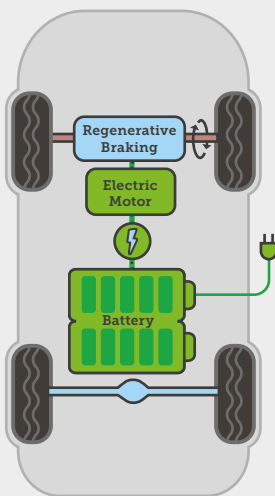
Battery electric vehicles (BEV) are powered completely by their battery, making them the only fully electric vehicles. There are other types of EVs, with Plug-In Hybrid Vehicles (PHEV) and Hybrid Electric Vehicles (HEV) also being common choices.

These cars still rely in part on expensive, polluting petrol and diesel. This means these vehicles still release harmful greenhouse gases fuelling climate change, and dangerous air pollutants which are damaging our health.

The Australian Government recognises this difference in its current vehicle policies. For example, there is an exemption from [Fringe Benefits Tax](#) available for electric cars. From 1 April 2025 onwards, PHEVs will not be considered a zero or low emissions vehicle eligible for this benefit ([ATO 2022](#)).

TYPES OF ELECTRIC VEHICLES

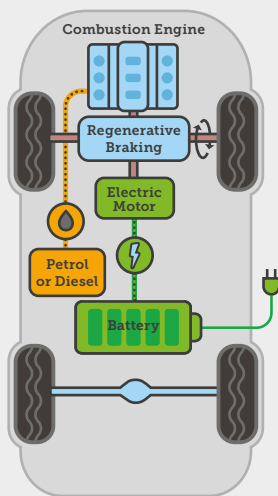
BEV
Battery Electric Vehicle



Powered by
100% Electricity
from Grid



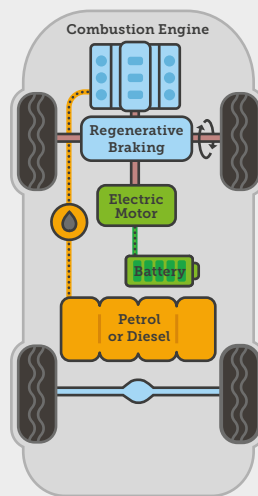
PHEV
Plug-in Hybrid Electric Vehicle



Powered by
Petrol or Diesel and
Electricity from Grid



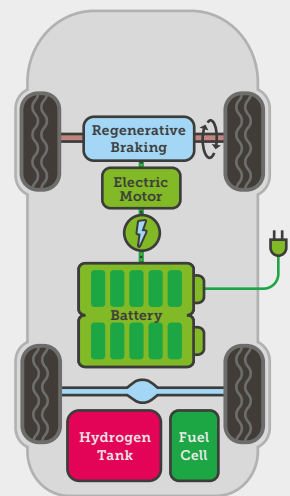
HEV
Hybrid Electric Vehicle



Powered by
Petrol or Diesel



FCEV
Fuel Cell Vehicle



Powered by
Hydrogen and/or
Electricity from Grid



BEVS ARE THE CHEAPEST AND CLEANEST TO RUN, AND PRICE COMPETITIVE

Most of the EVs on the road and being bought in Australia right now are full battery electric vehicles. There are 91 models of EVs currently available in Australia; the majority (65 percent) of these are BEVs ([EVC 2023](#)). BEVs are also soaring in popularity, with the BYD Atto 3, MG ZS EV, Polestar 2, Tesla Model 3 and Tesla Model Y, being the top five highest-selling EVs in Australia. These models accounted for 72 percent of EV sales in 2022 alone ([Drive 2023](#)).

Table 1 demonstrates that BEVs are cheaper to run, cleaner and price competitive. This is because:

- › Annual average fuel and/or charging costs can be up to 2.4 times more for hybrids than for BEVs.
- › BEVs are price competitive with hybrids from the get go. The cheapest BEV, the BYD Dolphin, is almost \$3,400 cheaper than the most popular HEV, the Toyota Rav 4; and more than \$8,000 cheaper than the most popular PHEV, the MG HS EV. While there are cheaper, smaller HEVs available, when considering the power costs over a vehicle's lifetime, the price difference with the BEVs closes.
- › BEVs do not emit any CO₂ while in use. By contrast, popular PHEVs emit around 40 CO₂ g/km and popular HEVs produce more than double this amount.
- › BEVs undoubtedly get drivers further for each charge. Comparing popular PHEVs and BEVs, some BEVs can have an electric driving range over nine times greater than PHEVs.

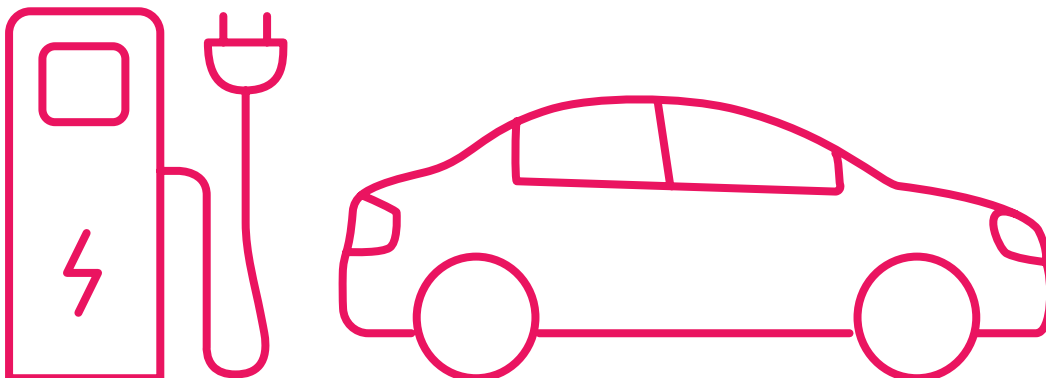


Table 1: Comparison of cost and emissions savings for the most popular and cheapest EVs.

	BEV			Hybrid - PHEV		Hybrid - HEV		
Model	BYD Dolphin (cheapest)	MG MG4 Excite 51 (second cheapest)	Tesla Model 3 (most popular)	Mitsubishi Eclipse Cross PHEV (tied cheapest)	MG HS Plus EV (most popular and cheapest)	Toyota Yaris (cheapest)	Toyota Corolla (second cheapest)	Toyota Rav 4 (most popular)
Variant details	2023 EM2E Dolphin Dynamic Auto	2023 MG MG4 Excite 51 Auto	2023 Tesla Model 3 Rear-Wheel Drive Auto	2023 Mitsubishi Eclipse Cross PHEV ES YB Auto AWD	2023 MG HS Plus EV Excite Auto FWD	2023 Toyota Yaris SX Hybrid Auto	2023 Toyota Corolla Ascent Sport Hybrid Auto Hatch	2023 Toyota RAV4 GX Auto 2WD
Starting price (excl. gov. charges)	\$38,890	\$38,990	\$61,900	\$46,990	\$46,990	\$30,190	\$32,110	\$42,260
Tailpipe emissions	0	0	0	43	39	76	97	109
Average annual cost (charging and/or fuel)	\$529	\$773	\$554	\$1,195	\$1,280	\$850	\$1,082	\$1,236
Electric range	410	405	513	55	63	N/A	N/A	N/A

Sources: Green Vehicle Guide (2023) for emissions, fuel costs and electric range; Redbook (2023) for car prices and Drive.com (2023) for the MG HS Plus EV; Whichcar (2023a; 2023b) to identify the cheapest EVs.

For context, the average emissions intensity for passenger cars and light SUVs in 2021 was 146.5 CO₂ g/km and 212.5 CO₂ g/km for heavy SUVs and light commercial vehicles (NTC 2022).

HYBRID FUEL COSTS AND TAILPIPE EMISSIONS ARE HIGHER THAN YOU THINK

Real-world use of hybrids has shown they produce far more emissions than captured in the laboratory test cycles used to determine their 'official' emissions data. PHEVs emit between two to four times more CO₂ on the road than in the lab on average (Plötz et al. [2021](#)). They produce five to seven times more emissions for city driving when the vehicle is not charged (Transport and Environment [2023](#)). A pilot study by the Australian Automobile Association (AAA) testing real-world fuel consumption compared to lab testing, found the PHEV tested was 166 percent higher than the official figures with a full state of charge, and 337 percent higher when tested from a low state of charge (AAA [2017](#)).

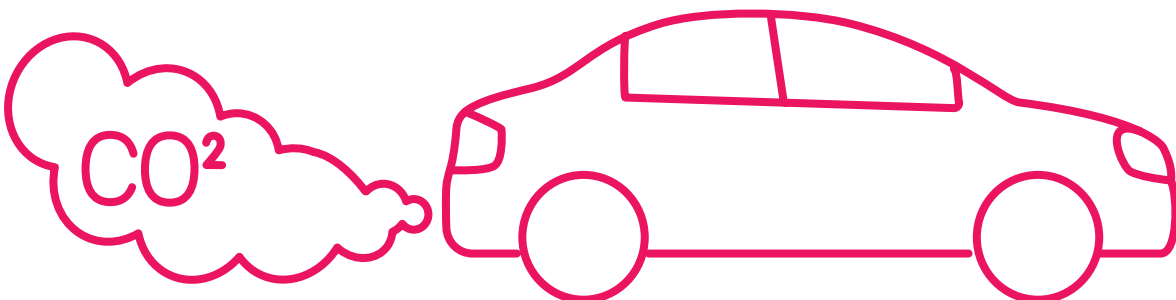
The gap between test cycles and real-world fuel consumption and emissions occurs because:

- › people may charge hybrids less often than assumed;
- › the fully electric driving range may be lower in real-world driving;
- › the real-world electric driving share is lower than assumed;

- › hybrids have higher fuel consumption when in combustion engine mode;
- › misuse of vehicle drive modes which are more energy and emissions intensive;
- › and higher than assumed fuel consumption during vehicle acceleration.

(Transport and Environment [2023](#); ICCT [2022](#); Karanam et al. [2022](#); Tu et al. [2021](#); Plötz et al. [2021](#)).

In countries which have fuel efficiency standards, hybrid sales can allow manufacturers to get away with higher emissions than their official fleet averages. This can mean they sell hybrids at the expense of making available more fully electric cars - which have the lowest charging costs and produce the least emissions. A study of three PHEV models - the BMW 3 series, the Peugeot 308 and the Renault Megane - found that if these PHEV emissions were properly accounted for, their manufacturers would need to sell an additional 247,000 BEVs in Europe to bring fleet emissions down to current levels (Transport and Environment [2023](#)).



THE BOTTOM LINE

Over 85 percent of the global car market has fuel efficiency standards and Australia is lagging far behind (DITRADCA [2023](#)). It is critical that we implement a strong fuel efficiency standard as soon as possible, which drives down our rising transport emissions. BEVs are cost competitive with hybrids, the cheapest to run and the cleanest of all electric vehicles; and Australia's standards should be set up to recognise this difference.

At the end of the day, a strong [fuel efficiency standard](#) can bring more choice of both lower and zero emissions vehicles to Australia, helping local drivers to save on fuel bills no matter which car they choose to buy.

To discuss this briefing paper further, please contact:

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