

Electric Vehicles

Why buy an EV?

Advantages:

Cost!

EVs are cheaper over the lifetime of the vehicle.

Electricity is cheaper than fuel.

Servicing is negligible, as Battery EVs are far simpler than Internal Combustion Engines (ICE)

From Transport for NSW website:

<https://www.transport.nsw.gov.au/projects/electric-vehicles/why-buy-an-electric-vehicle>

...fuel savings of up to 70% and maintenance savings of around 40%.

For an average car travelling 13,700 km per year, this could amount to an annual fuel saving of \$1000, or \$1200 if the EV is able to charge overnight on an off-peak tariff.

Battery electric vehicles (BEVS) have a lot less moving parts than a petrol or diesel car. There is relatively little servicing and no expensive exhaust systems, starter motors, fuel injection systems, radiators and many other parts are not needed in an EV. Brake pads have very little wear with regenerative braking.

Great Driving Experience:

Quieter, Smoother, Faster Acceleration, Better Handling due to low centre of gravity, Less Stressful (increasing with better driving automation).

Energy Efficiency:

Electric vehicles' efficiency up to 90% vs Internal Combustion Engine max 40%

Regenerative Braking:

Recovers energy and recharges the battery by using the electric motor as a generator when slowing down or going downhill.

More Environmentally Friendly:

No emissions while driving

Batteries can be reused for static storage when capacity drops too low for vehicle use and are almost completely recyclable into new batteries.

Batteries often outlast the vehicle and have an 8 – 10 year warranty.

Even coal generated using is more efficient than an ICE.

Refining and transporting fossil fuel also generates a lot of CO₂.

EVs are able to satisfy most people's requirements:

Average Australian drives about 40 km / day. EVs can do 200 - 600km.

Home chargers are weatherproof and allow charging overnight. 10–20km/hour

Chargers located in carparks eg. shopping centres or workplaces can provide 30-45km/hour and are usually free.

Fast chargers provided by charging companies can provide 400-500km/hr depending on the charger and the car.

Higher Resale value:

As EV demand increases and ICE vehicle demand decreases this will increase.

Already there are some used Teslas selling for more than their purchase price as there a delivery delay of months and with some models a year or more.

They will be opening 2 factories in the coming months each capable of producing 1 million, and more, vehicles a year when fully operational.

Tesla produced 500,00 cars in 2020, and will make over 900,000 in 2021.

Disadvantages:

Initial Cost:

This is decreasing as manufacturing and battery efficiencies improve.

The battery is the most expensive part of a BEV.

Energy Density:

A kilogram of petrol contains 12,000 watt hours of energy (an ICE motor at 30% efficiency, creates 4kWh of useful work from this)

A 1 kg Lithium Ion battery is 200 watt hours so at 90% efficiency, 20kg of batteries would be required to produce the same putput.

A bigger battery allows the vehicle to travel further but weighs more and takes longer to charge.

EV manufacture produces more carbon:

Even the most expensive EVs will offset manufacturing emissions within 18 months

<https://www.carsales.com.au/editorial/details/advice-why-should-you-not-buy-an-electric-car-117954/>

Hybrid Vehicles:

Basic; Electric motor assists ICE motor or allows short electric only trips

PHEV; Plugin Hybrid EV

EV with range extender ICE motor

Electric Trucks and Buses:

Already in use in some countries.

School Buses can be connected to the grid during idle times.

A number of heavy duty electric trucks are already being made or will be soon.

Delivery trucks and vans are also being produced and more are planned.

Vehicle to Load:

Allows connection of electrical equipment to the car's battery via an inverter.

Work tools or even power a home for up to 3 days.

Vehicle to Grid:

Allowing the car battery to support the electricity grid during high demand and charging during off peak times.

EV Conversions:

Quite a few classic cars are being converted to EVs and there are companies specializing.

Porches

Jaguars

Land Rovers

Hydrogen Vehicles:

Pro:

Quick refuel.

Con:

A hydrogen vehicle uses a fuel cell to convert hydrogen into electricity to power the car's electric motor and charge the battery.

A fuel cell is only 20 - 60 percent efficient but still better than ICE at 25 – 30%.

There is also the added complexity and weight of the fuel cell and the tank of compressed hydrogen.

There are very few hydrogen refueling stations available. One each in Syd, Can, Mel, Bri.