



www.cleanstate.org.au

Steffen Zorn, PhD

Associate Professor University of South-Eastern Norway

Volunteer @ CleanState

Electric vehicles – myths and reality

My EV history so far – a PHEV and a BEV

2016 – used **PHEV**



2019 – Tesla Model 3 SR+ (**BEV**)



Myth #1 - Electric vehicles are expensive



Battery Electric Passenger Vehicles – available now

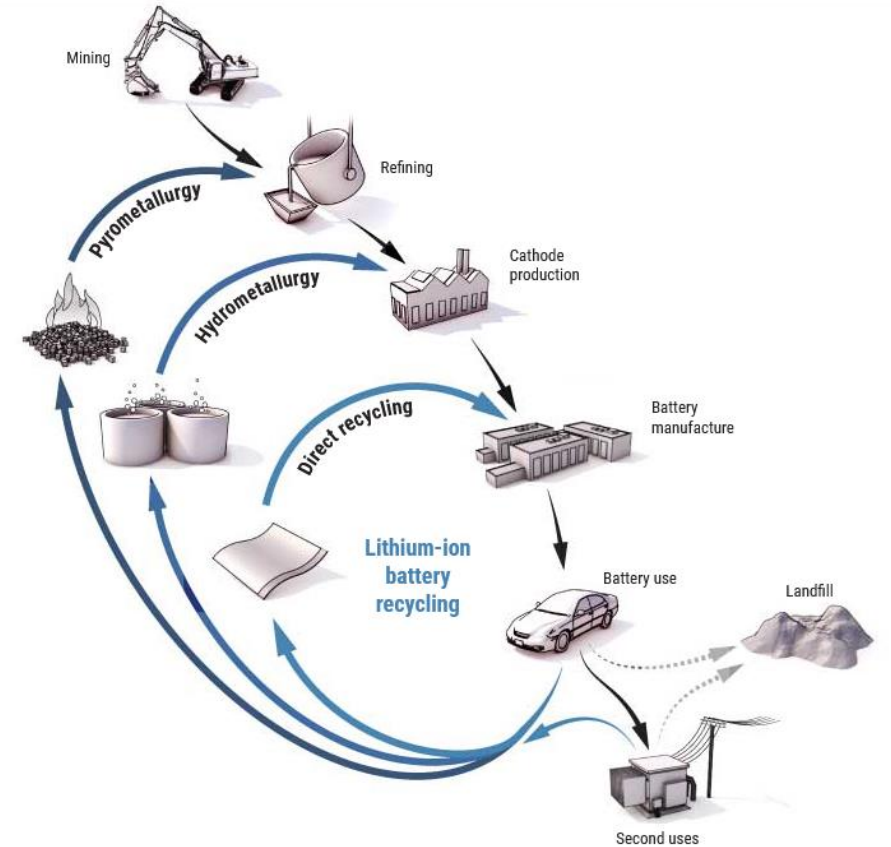
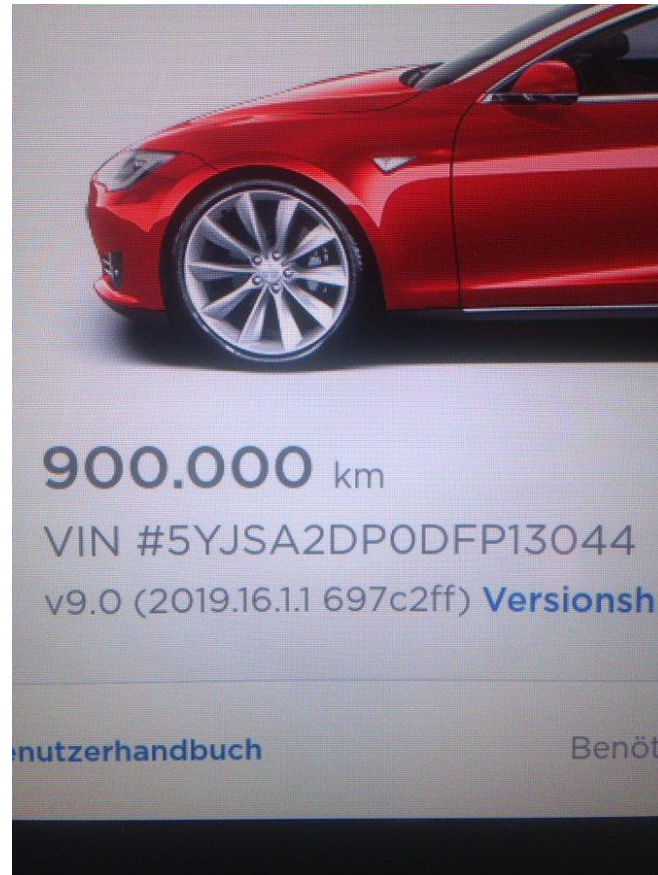
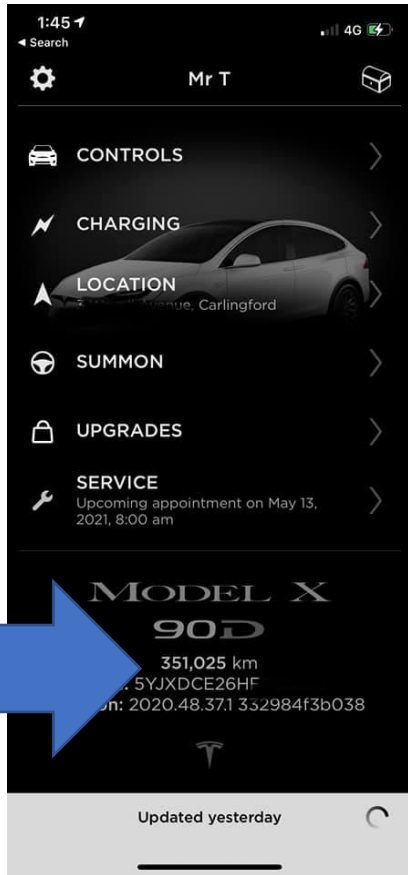
make/model	WLTP range ³ km	Size class ¹¹	Battery size/s: kWh	Max charge rates in kW AC(DC) ⁷	Tow rating in kg unbraked/braked	Price ⁴
Audi e-tron 50	336	L SUV	71	11(150)	750/1800	\$148,000
Audi e-tron 55	417	L SUV	95	11(150)	750/1800	\$165,699
Hyundai Kona electric–SR	305	S SUV	39	7.2(44)	X	\$59,000
Hyundai Kona electric–LR	484	S SUV	64	7.2(70)	X	\$64,000
Hyundai Ioniq electric	311	S Pass	38	7.2(44)	X	\$54,000
Hyundai Ioniq 5	451	M SUV	73	11(220)	750/1600 ⁹	\$77,300
BMW i4 eDrive40	590	M Pass	81	11(200)	750/1600	\$111,000
BMW iX3	460	M SUV	80	11(155)	750	\$129,000
BMW iX Drive40	420	L SUV	75	11(150)	750/2500	\$150,000
BMW iX Drive50	620	L SUV	110	11(200)	750/2500	\$186,000
Jaguar I-Pace	470	L SUV	90	11(100)	750/750	\$127,990
Kia e-Niro	455	S SUV	64	7.2(70)	300/300	\$67,500
Mazda MX-30 E35 Astina	200	S SUV	35.5	6.6/50	X	\$65,000
Mercedes EQA	426	S SUV	66.5	11(100)	X	\$83,000
Mercedes EQC	400	M SUV	80	7.4(110)	X	\$151,500
MG ZS EV	263	S SUV	44.5	7(50)	X	\$45,000
Mini Cooper SE	232	Li Pass	32.6	11(50)	X	\$62,000
Nissan Leaf ZE1	270	S Pass	40	6.6(50)	X	\$53,785
Nissan Leaf ZE1 e+	385	S Pass	62	6.6(100)	X	\$65,000
Polestar 2 std. range (2WD)	440	M Pass	69	11(130)	750/1500	\$66,387
Polestar 2 long range (AWD)	540	M Pass	78	11(155)	750/1500	\$77,067
Porsche Taycan 4S	431	L Pass	79/93 ⁵	11(270)	X	\$218,224
Tesla Model 3 Std Range 2WD	491	M Pass	50	11(100)	750/910	\$67,485
Tesla Model 3 L. Range AWD	614	M Pass	75	11(250)	750/910	\$79,047
Volvo XC40 Recharge	400	S SUV	78	11(150)	750/1500	\$84,000

<https://www.aeva.asn.au/battery-electric-vehicle-models-bevs>

Performance and operational costs




	 <p>Tesla Model 3</p>	 <p>Toyota Camry</p>
Drivetrain power	211kW 0-100 km/h – 5.6 sec	135kW 0-100 km/h – 10.3 sec
Fuel costs for 100km	144Wh/km x \$0.204651/kWh \$2.95 (grid powered) \$1.51 (50% grid, 50% solar powered)	7.8l/100km x \$1.50/l ~\$12
Maintenance after 20,000km	~\$50	~\$300 (RACQ \$19.42/month)
Estimated operational costs for 150,000km (fuel and maintenance)	~ \$ 3,000	~ \$ 20,000
Price	\$60,900	\$34,900

Myth # 2 – The battery doesn't last long

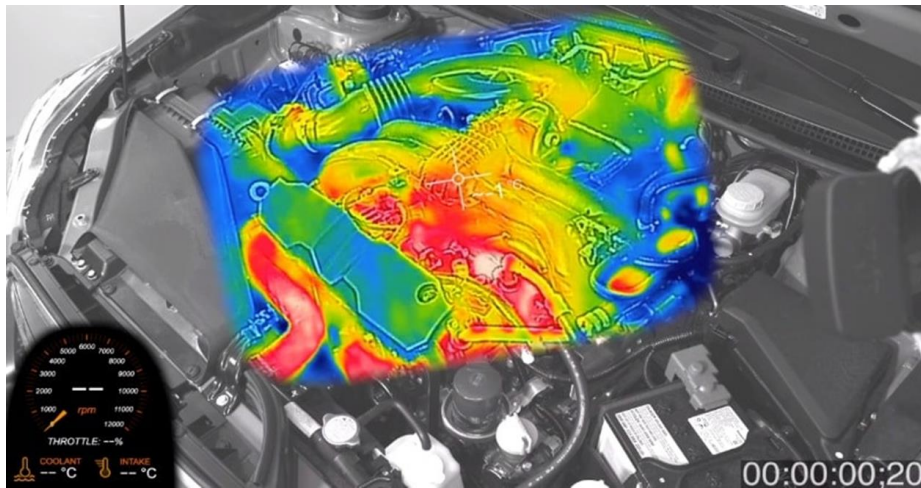


Estimation: 400,000 – 800,000 km

Myth #3 – Emissions of an EV are higher than emissions of a modern petrol car

Emissions - CO2e per km WTW – Well to Wheel		
Manufacturing	40-100 kg/kWh → 51g (23g for the battery)	32g
Driving	40g (Europe 40% fossil fuels, Australia ~80% fossil fuels)	228g (Australia's average emissions-intensity for passenger vehicles is <u>45 % higher</u> than Europe's)
Total	~91g 	~260g
Energy efficiency (power available to move the car)	~80%	12-30%

Why is an EV more efficient?



Moving parts:

Petrol engine ~200

Electric motor ~20

Myth #4 – The grid will break if we change to EVs and charging will take forever

Oven 2-8kW

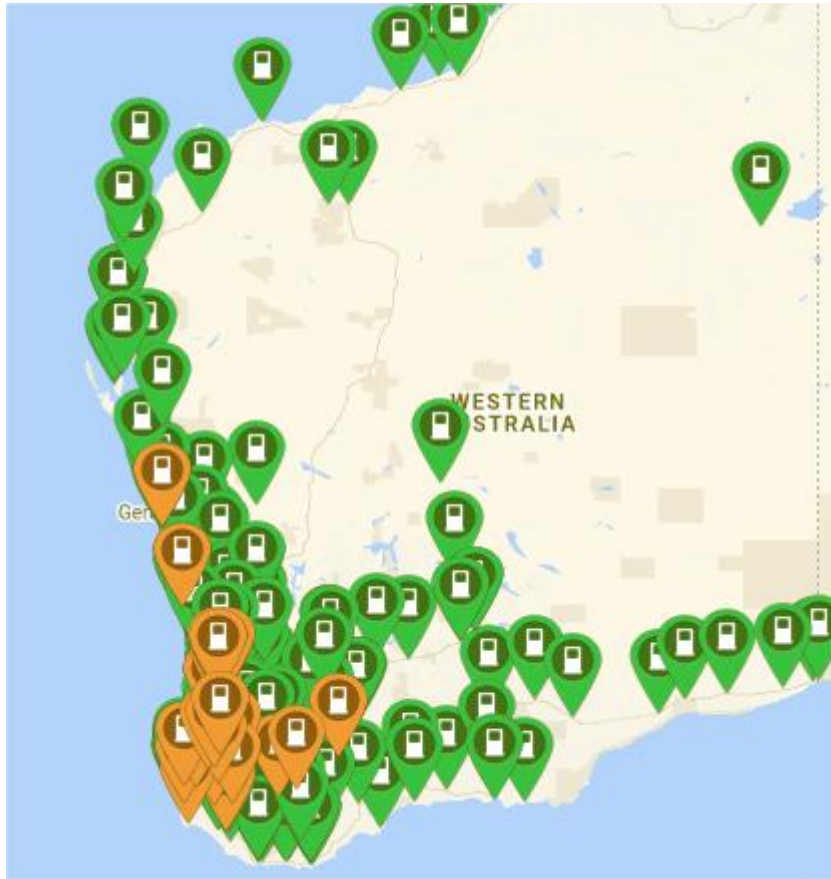
Powerpoint: ~2kW, ~15km per hour

Wallcharger: up to ~11 kW, up to ~75km per hour

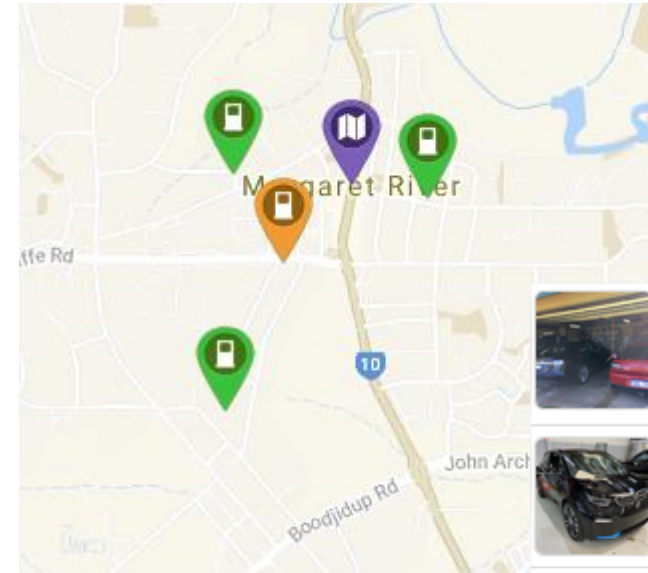
Tesla supercharger (V3): up to 275km in 15min








Range anxiety



The Plugshare app shows the condition of a charger and if it is occupied



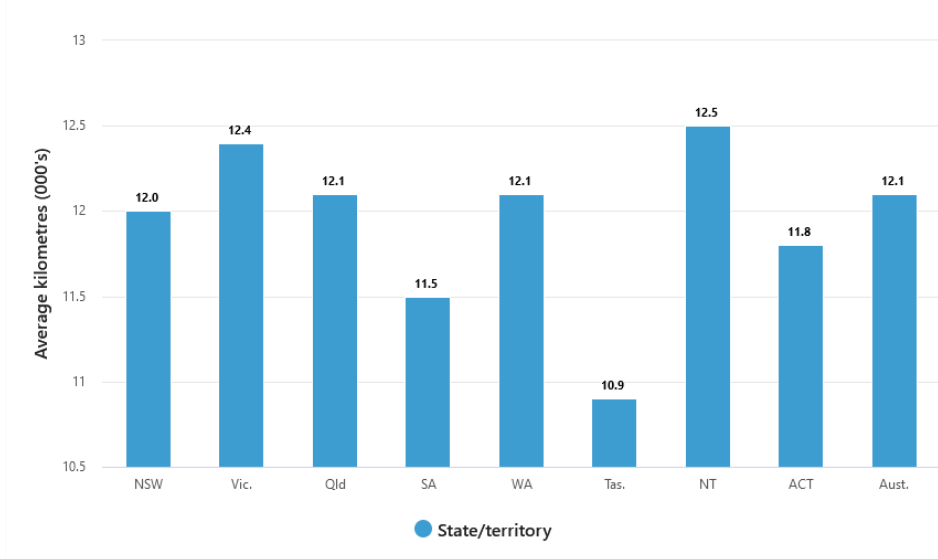
	DMI Tesla Model S S85 22 Kilowatts	Jun 8, 2021
	Alex BMW 2018 i3	Jun 6, 2021
	JeffWilson Hyundai Kona Electric 2019 CCS2 Combo charging 42kW	Jun 4, 2021
	Joseph - Tango T600 Tesla Model 3 244v 11 Kilowatts	Jun 3, 2021
	Joseph - Tango T600 Tesla Model 3 Cracked chademo plug water seepage into plug	Jun 3, 2021

Myth #5 – “An EV cannot tow a boat”



Do you really need your own car?

Average kilometres travelled by state and territory of registration



An average car in WA drives 33km per day!



<https://www.tillerrides.com/>



References, websites and articles worth visiting

<https://www.aeva.asn.au/battery-electric-vehicle-models-bevs/>

<https://www.drive.com.au/news/new-renault-5-could-become-australias-cheapest-electric-car-cmf-bev-electric-platform-to-cut-prices-by-a-third/>

<https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>

<https://fueleconomy.gov/feg/Find.do?year=2021&vehicleId=43821&zipCode=96740&action=bt3>

<https://www.carsales.com.au/toyota/camry/price/2021/ascent-562463/>

<https://www.racv.com.au/royalauto/moving/cars/new-car-reviews/2018-toyota-camry.html>

<https://www.topspeed.com/cars/car-news/stop-worrying-about-battery-life-if-you-own-a-tesla-model-3-ar185236.html>

Hoekstra, A. and Steinbuch, M., Comparing the lifetime green house gas emissions of electric cars with the emissions of cars using gasoline or diesel. Eindhoven University of Technology 2020.

Moro, A. and Lonza, L., 2018. Electricity carbon intensity in European Member States: Impacts on GHG emissions of electric vehicles. Transportation Research Part D: Transport and Environment, 64, pp.5-14.

Electric Vehicle Council. 2019. "Cleaner and Safer Roads for NSW." <https://electricvehiclecouncil.com.au/reports/cleaner-and-safer-roads-for-nsw/>.

[https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Electricity_production_by_source,2019\(%25\).png](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Electricity_production_by_source,2019(%25).png)

<https://www.transportenvironment.org/what-we-do/electric-cars/how-clean-are-electric-cars>

<https://www.energy.gov.au/data/electricity-generation>

<https://theconversation.com/climate-explained-why-switching-to-electric-transport-makes-sense-even-if-electricity-is-not-fully-renewable-136502>

<https://driveelectric.org.nz/research-confirms-environmental-benefits-of-electric-vehicles>

<https://www.fueleconomy.gov/feg/atv.shtml>

<https://www.carsguide.com.au/car-news/australias-fuel-is-among-the-dirtiest-in-the-world-and-were-not-doing-anything-about-it>

<https://thedriven.io/2018/11/15/hydrogen-fuel-cell-cars-have-three-times-emissions-of-battery-evs-ug-study/>

<https://theconversation.com/hydrogen-cars-wont-overtake-electric-vehicles-because-theyre-hampered-by-the-laws-of-science-139899>

https://www.theguardian.com/australia-news/2021/jun/04/where-will-i-fill-it-up-my-week-in-lockdown-with-a-toyota-hydrogen-powered-car?CMP=soc_567

<https://www.carsguide.com.au/ev/advice/hydrogen-vs-electric-cars-whats-the-difference-and-which-is-better-82898>

<https://www.sciencemag.org/news/2021/05/millions-electric-cars-are-coming-what-happens-all-dead-batteries>

<https://www.racv.com.au/royalauto/moving/news-information/used-ev-battery-recycling.html>

Q&A

Please feel free to e-mail me for further questions:
steffen.zorn@aussiebbroadband.com.au