

By: Bryce Gaton, EV Choice Consulting

EV writer/commentator: TheDriven.io, Renew magazine

A-Class electrician/Registered Electrical Contractor

The 2030 home and electric transport

What is an EV?

How do EVs recharge?

How can you safely get power FROM an EV?

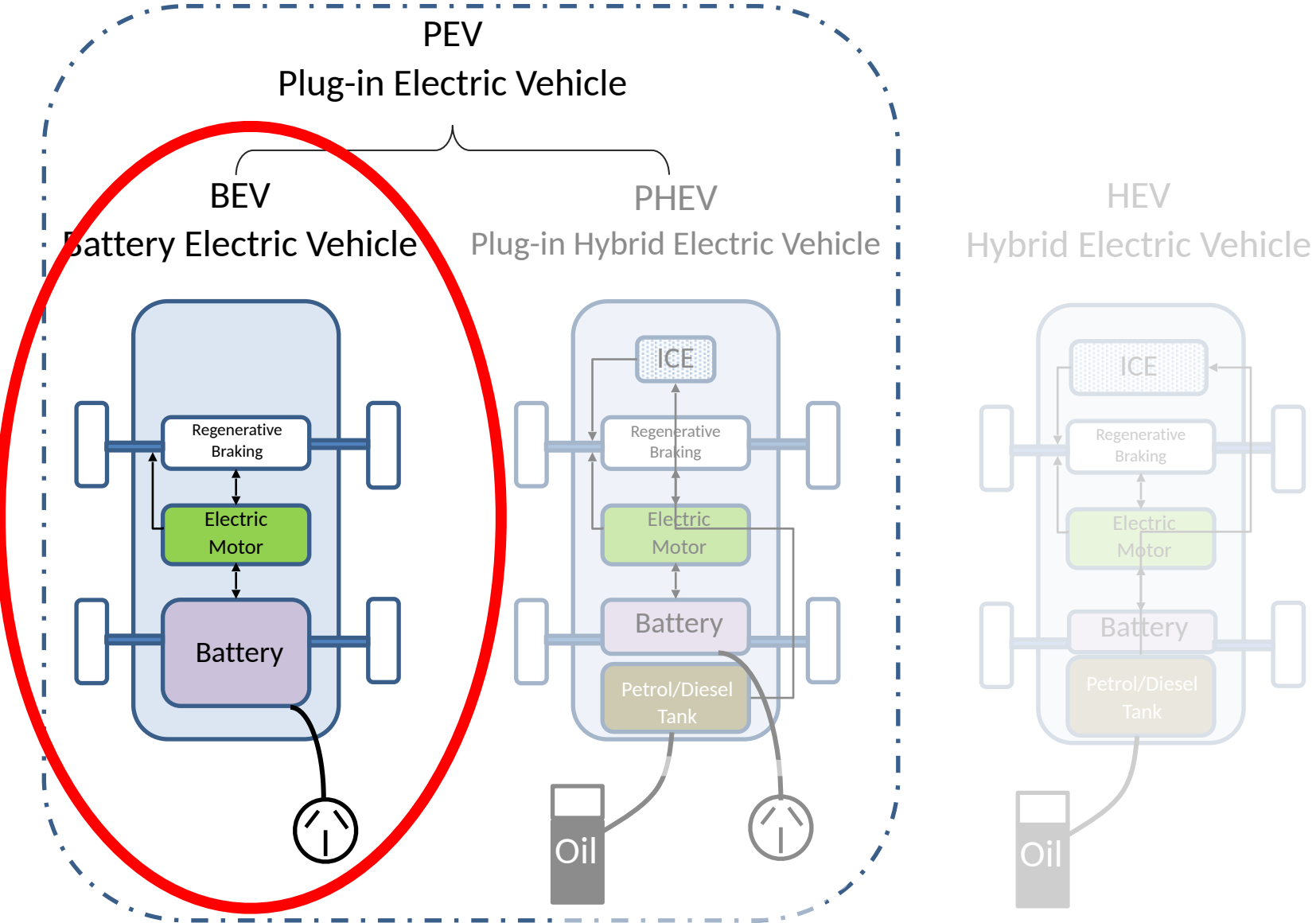
Options to consider

New EV Charging Infrastructure course for electricians

Further EV information sources

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What is an 'EV'?



Remember: EV 'refuelling' paradigm is different

Think plug-n-ignore 'mobile phone' model

NOT



find, stop and act as a
'fuel pump attendant'

What is an EVSE?

EVSE = Electric Vehicle Supply Equipment. (= car charger)

AC:

DC (fast-charge):

Portables

Hard wired



Image: JetCharge



Image: Tesla



Image: Tritium









Image: ABB



Image: EVOLUTION

Are there different EV plugs in Australia?

Current type	Region		
	Japan	Europe, rest of world inc. Tesla 3 & Y	Tesla: (plug) N. America
AC			
Plug name:	Type 1 (J1772)	Type 2 (Mennekes)	NACS
DC			
Plug name:	CHAdeMO	CCS2	NACS

Coming trend: V2X

- ❶ V2L: Vehicle to Load → CCS: AC
CHAdeMO: DC
 - ❷ V2H/B: Vehicle to Home/Building
 - ❸ V2G: Vehicle to Grid
- } DC

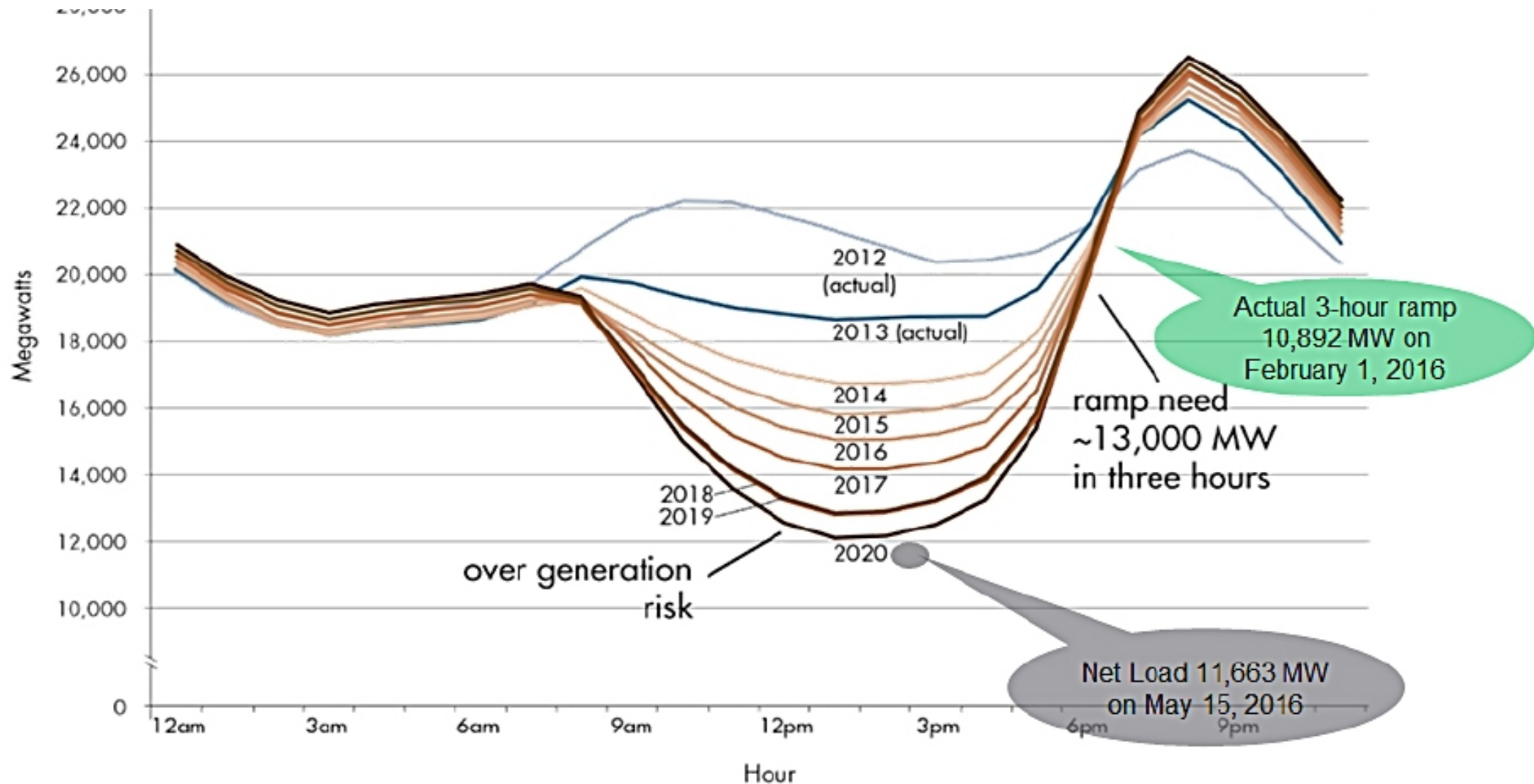
Currently:

- a) CHAdeMO does V2X, BUT CHAdeMO lost the Plug War
- b) CCS being developed to do V2X (Many cars now offer V2L)
- c) Some CCS cars arriving soon will have V2H/G function
- b) CCS V2H systems will start to arrive late this year
- c) Likely 2025 for V2G (requires grid communications)

Image: Nissan Australia



When should I charge an EV?



Models for balancing EV Charging & the grid:

'Dumb' chargers & power points

Customer managed

Charger provides one rate of charge

Price signals: peak and off-peak tariffs

Prices can vary with retailer & season

Only charge timing is selectable

Customer education important

'Smart-ish' chargers: behind the meter

Can load sense and adjust charging speed

Can be customer programmed for:

- Tariff (kWh price) times
- Solar PV priority usage

Some customer education needed

'Smart' chargers

Grid managed

(in addition to customer settings)

Charging can be externally ramped up/down,

on/off in addition to customer settings

Customer understanding important



Futureproofing your electrical installation



- Smart chargers may be mandated in the future
- V2X options coming (early 2025?)
- Moving to all-electric homes
- i.e: when doing electrical work: **PLAN AHEAD**
 - Upgrade switchboard to 24 slot minimum
 - For an EVSE: install cable for 32A, even if a standard outlet for now.
 - Run data cables between EVSE and switchboard (or to data hub).
 - Install a charger with OCPP 1.6J or above programming language



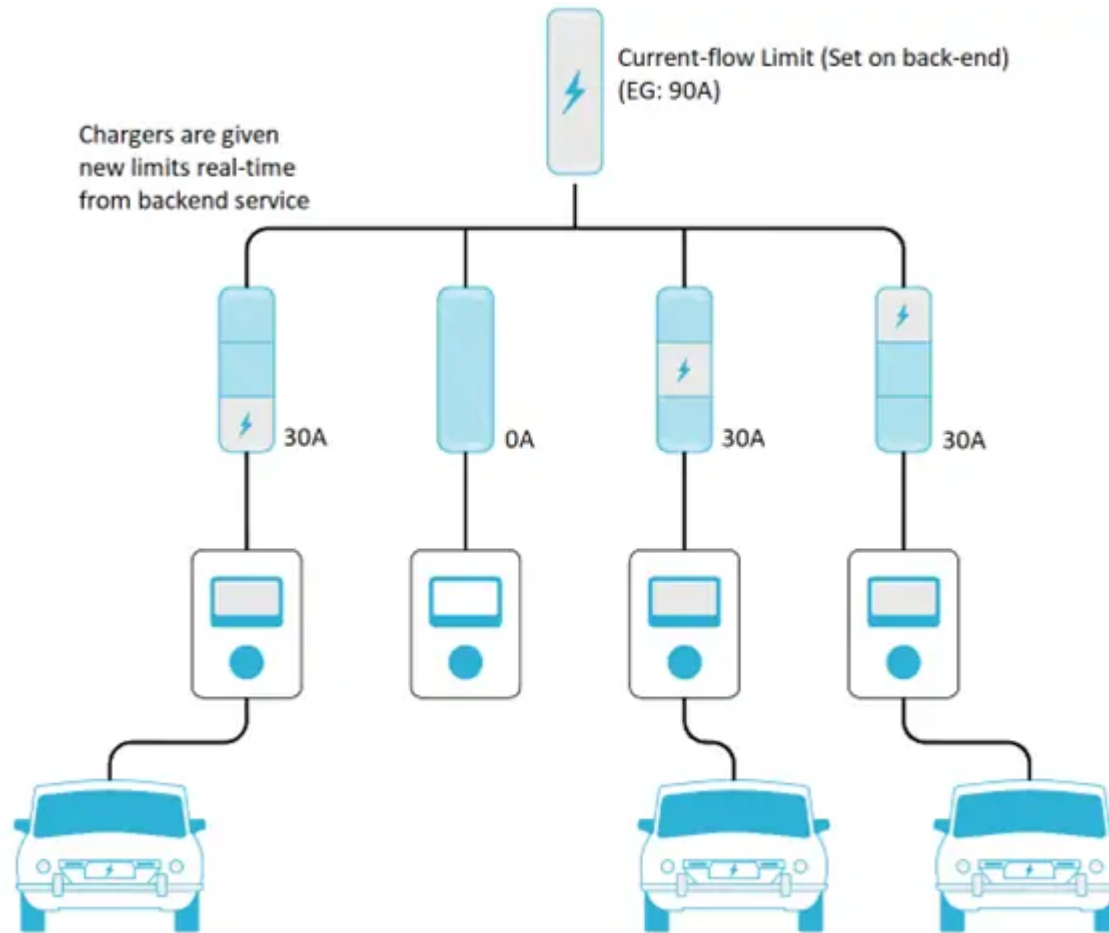
No off-street parking?

Port Phillip Council trial: Kerbcharge



Apartments:

Load sharing and load management is key



New accredited EVSE course for electricians:

Learner Guide

22609VIC

Course in Electrical
Vehicle Charging
Infrastructure
up to 22 kW

**Electric Vehicle
Charging
Infrastructure**

VU23286

Design Electric Vehicle Charging
Infrastructure Installation up to 22 kW

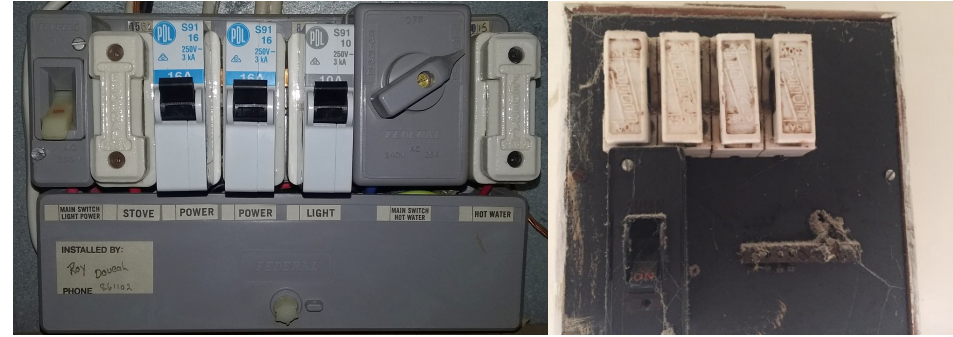
VU23287

Test and Commission Electric Vehicle
Charging Infrastructure Installation
up to 22 kW



How not to blow the budget, or the fuse!

- 10, 15A outlets: probably no issues*
- Single phase home, 32A EVSE*:
 - 80A supply fuse, gas household: probably no issues
 - 40A supply fuse, gas household. Swap main switch to circuit breaker
 - 80A supply fuse, all-electric house. Some issues
 - Use EVSE with load sensing to reduce charging rate at peak house use times.
 - 40A supply fuse, all electric house.
 - Change main switch to circuit breaker, use load sensing EVSE.
 - EVSE will ramp down at a lot of the time, but 32A still possible overnight and/or during day with solar.



* Note: if old fuse switchboard, old mains cables etc: new switchboard and maybe a rewire required.
<https://thedriven.io/2023/08/07/ev-explainer-the-costs-of-installing-electric-vehicle-charging-points-at-home/>

EV information: AEVA/EV Choice Fact Sheets



EV FACT SHEET

Nissan ZE0/AZEO Leaf

(2010 – 2017)

Created and written by:
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bryce@evchoice.com.au



Image: B Gatton

INTRODUCTION

When the original ZE0 Nissan Leaf was launched in late 2010, it became the first (current era) mass produced full battery electric vehicle (BEV) to be designed from the ground up. (To that time, the only others were based on petrol cars: the 2010 Mitsubishi iMIEV was based on the petrol i-car, and the only Tesla then available was built using a Lotus Elise body).

Ground-breaking in many ways – the Leaf won a multitude of

INTRODUCTION (continued)

Note: a number of private (or 'grey') imports of Japanese model AZEO Leafs has occurred between Nissan Australia ceasing imports in 2013 and recommencing with the ZE1 Leaf in 2019, including the bulk-buy schemes offered by the GoodCarCompany (<https://www.goodcar.com.au>).

Important notes:

The biggest issues with private imports are service, warranty and recall support. Privately imported vehicles are generally not supported by the dealer networks who often refuse to work on them, or perform any warranty or recall work that would have been done for free in their country of origin.

BUYING SECOND-HAND

All Australian delivered (Nissan Australia supported) Leafs were the one spec with the only option being paint colour.

As Australian delivered ZE0 Leafs are 2011/12 (first generation) Leafs, they all have the early battery chemistry that degrades faster than later versions. It is therefore

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Leaf options:
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aeva.au/fact-sheets




EV FACT SHEET

Discontinued AUSTRALIAN DELIVERED BEV passenger car models - from 2010

Created and written by: Bryce Gatton
Contact: bryce@evchoice.com.au

April 2024

make/model	Driving range ¹ km	vL ² V0 ³	Size class ⁴	Battery size/s: kWh	Max charge rates in kW AC(DC) ⁵	Tow rating: Unbraked/Braked kg	Prices ⁶	Years sold in Australia
Audi e-tron 50	334	N	L SUV	71	11(150)	750/1800	\$80k up	2020-23
BMW i3-60Ah	130	N	Li Pass	22	7.4(NA) ⁷	X	\$25k up	2014-16
BMW i3-94Ah	183	N	Li Pass	33	7.4(NA) ⁷	X	\$35k up	2016-19
BMW i3-120Ah	246	N	Li Pass	42	11(50) ⁸	X	Note 8	2019-22
BYD T3 van (approx. 15 in Aust)	300	N	700 kg	45	6.6(50)	X	Notes 8,9	2022
BYD E6 (approx. 75 in Aust)	370 TBC	N	M Pass	72	40(NA)	X	\$25k up	2019
Hyundai Ioniq-28 kWh	230	N	S Pass	28	6.6(69)	X	\$26k up	Jan. 2019-19
Hyundai Ioniq-38 kWh	311	N	S Pass	38	7.2(44)	X	\$30k up	Late 2019-22
Hyundai Kona OS Std Range	305	N	S SUV	39	7.4(77)	X	\$36k up	2021-23
Hyundai Kona OS Long Range	484	N	S SUV	64	7.4(77)	X	\$39k up	2019-23
Kia e-Niro	455	N	S SUV	64	7.2(77)	300/300	\$40k up	2021-24
Mazda MX-30 E35 Activa	200	N	S SUV	35.5	6.6(50)	X	\$37k up	2021-23
Mitsubishi iMIEV	100	L ³	Mi Pass	16	3.6(40)	X	\$10k up	2010-14
Nissan Leaf ZE0	120	L ³	S Pass	24	3.6(46)	X	\$11k up	2011-12
Renault Kangoo ZE van	160 ¹⁰	X	650 kg	33	7.2(NA)	322/322	\$20k up	2016-22
Renault ZE40 Zoe	317	X	S Pass	44	22(NA)	X	\$27k up	2017-20
Tesla Model S	320-435	X	UL Pass	60-90	11(120)	X	\$45k up	2014-20
Tesla Model X	483	X	UL SUV	100	11(120)	750/2250	\$70k up	2016-20
Tesla Roadster	393	X	Sp.	53	TBC	X	Note 8	2011-12



EV FACT SHEET

NEW BEV passenger car models currently (or soon to be) available in Australia

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

October 2022

Battery Electric Passenger Vehicles – available now

make/model	WLTP range ¹ km	V2L ¹¹	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	N	L SUV	71	11(150)	750/1800	\$148,000
Audi e-tron 55	417	N	L SUV	95	11(150)	750/1800	\$165,699
BMW i4 eDrive40	520	N	M Pass	81	11(200)	750/1600	\$111,000



EV FACT SHEET

Jaguar I-Pace

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Jaguar I-Pace. Image: Jaguar

INTRODUCTION

The Jaguar I-Pace is the first electric luxury vehicle from manufacturer. As such it is...



EV FACT SHEET

Hyundai Ioniq electric

Created and written by:
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2018 only electric. Image: HMC.

INTRODUCTION

The Ioniq electric is part of that includes a BEV (Battery Electric Vehicle).



EV FACT SHEET

Tesla Model S

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Image: Tesla

INTRODUCTION

Worldwide sales of the BEV with the PHEV released in January 2019.

DRIVING RANGE

The Model S has a total cycle range of 633 km for the 'Performance' 430 km for the 'Long Range' and 512 km for the 'Standard' version according to the Australian Green Vehicle Guide website. (<https://www.greenvehicles.com.au>)

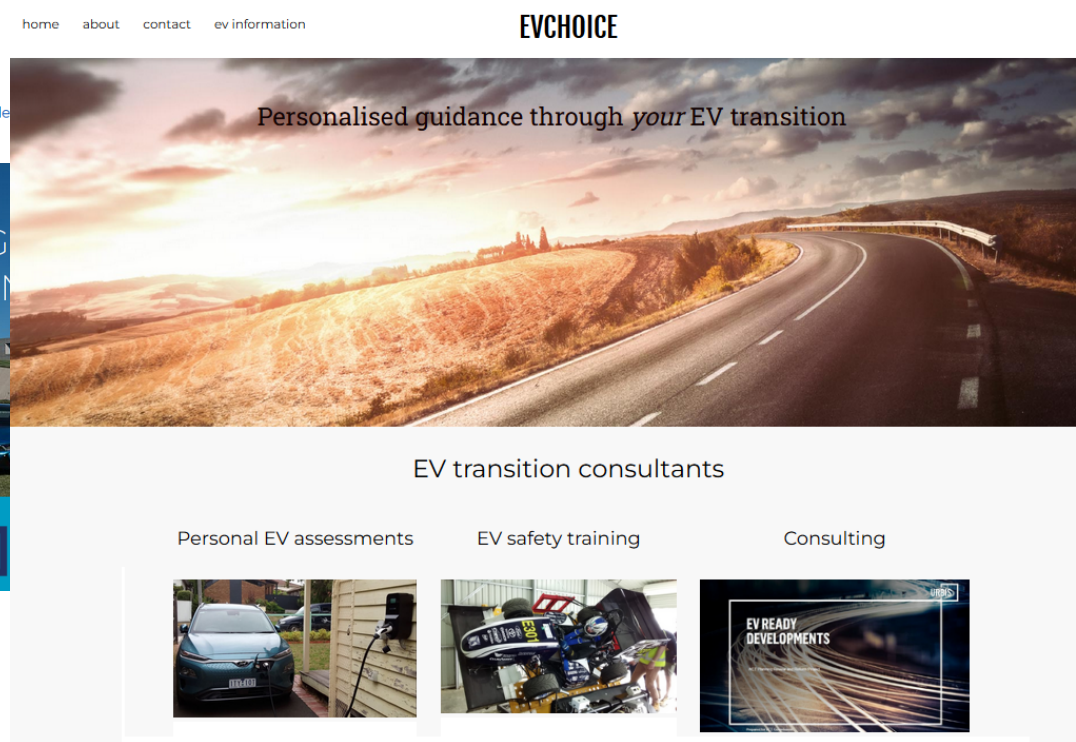
Real world driving ranges however are generally found to be less than real cycle figures. For instance, the long range version has a real world range of around 540 km.

As an example, the Model S Long Range could, at its limit, make a round trip from Melbourne CBD to Ballarat and back – provided neither the heating or air conditioning were used. For this sort of trip, a 30 min or so top-up AC charge over lunch in Ballarat, or a 5 – 10 min DC fast charge along the way at the soon-to-open Thorndon Tesla supercharger site would be recommended.



To find out more: Australian websites

- TheDriven: <https://thedriven.io/>
- Electric Vehicle Council: <https://electricvehiclecouncil.com.au/>
- EV Choice: www.EVchoice.com.au



Any burning questions?
Save to end of session please

Want a copy of these slides: EVNews@bigpond.com

Addendum 1: Further reading:

- European air quality standards:
<https://ec.europa.eu/environment/air/quality/standards.htm>
- EV Council report (Australia) reports: <https://electricvehiclecouncil.com.au/reports/>
 - <https://electricvehiclecouncil.com.au/reports/home-ev-charging-and-the-grid-impact-to-2030-in-australia/>
 - https://electricvehiclecouncil.com.au/wp-content/uploads/2023/07/State-of-EVs_July-2023_.pdf
 - Smit, Whitehead and Washington, 2018. Where are we heading with electric vehicles, Air Quality and Climate Change, V52, No.3, September 2018, 18 – 27.
- Climate Council report: Waiting for the Green Light: Transport Solutions to Climate Change. 2018. <https://www.climatecouncil.org.au/resources/transport-climate-change/>
- Australian Vehicle Emission Standards: <https://www.infrastructure.gov.au/vehicles/environment/emission/index.aspx>
- Senate Select Committee Report on Electric Vehicles: https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Electric_Vehicles
- Union of Concerned Scientists: Top Five Reasons to Choose an Electric Car <https://www.ucsusa.org/resources/top-five-reasons-choose-electric-car>

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