Choosing and using an EV

- Thinking ahead to 2035…
- How do you charge?
- Charging versus refuelling
- Charging options
- How to find a charger
- What's coming soon
- Buying second-hand?
- EV Mythbusting
- Useful EV resources

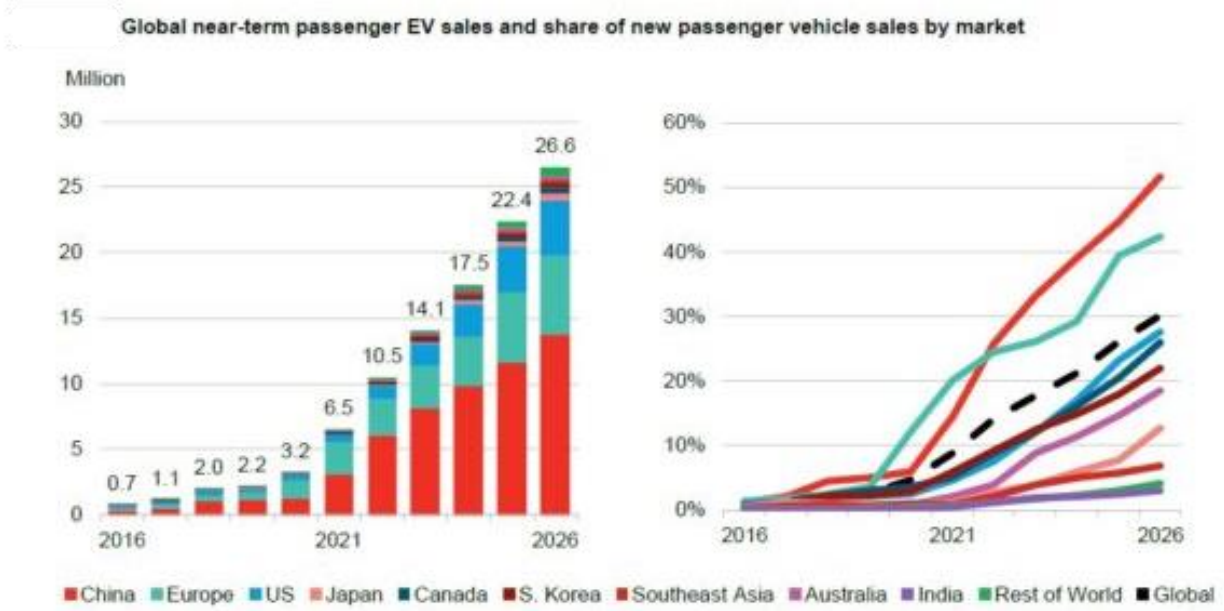
By: Bryce Gaton, EV Choice Consulting

EV writer/commentator, TheDriven.io and Renew magazine

It’s 2035

- BEV sales have passed 80% of new cars and Australia’s car parc has hit 50% BEV.
- Fuel sales have dropped off a cliff and petrol stations are closing at a rapid rate.
- Internal Combustion Engine (ICE) car resale values have plummeted as BEVs are the desired car - but BEVs are still only 50% of the second-hand market.

Images: left-B Gaton, right-Bloomberg NEF



EV Transition is coming in ALL forms:

- Trucks
- Machinery
- Tractors
- Bicycles & scooters
- Motorbikes
- Planes
- ‘Flying cars’
- Autonomous cars
- Busses
- Ferries
- General equipment
- Boats















BEV versus ICE running costs:

Assumptions:

- 10,000 km/yr
- 2024 Hyundai Kona electric EV at 14.7 kWh/100 km[1]
  - charge overnight only, EV off-peak tariff of 6c/kWh
- 2024 Hyundai Kona petrol 1.6L auto, 2WD at 6.2 L/100km[1]
  - using 91 RON fuel at $2.00/L

Fuel cost comparison (per 10,000 km):

EV Kona: **$90**

ICE Kona: **$1240**

Fuel savings: $1,150

Service savings: estimate **$60/yr[2]**

Total saving using EV/10,000 km (approx.): **$1,200**

Notes:

1: WLTP test cycle data from Hyundai Australia

2. Service costs - EV $520/2 yrs, ICE $320/yr

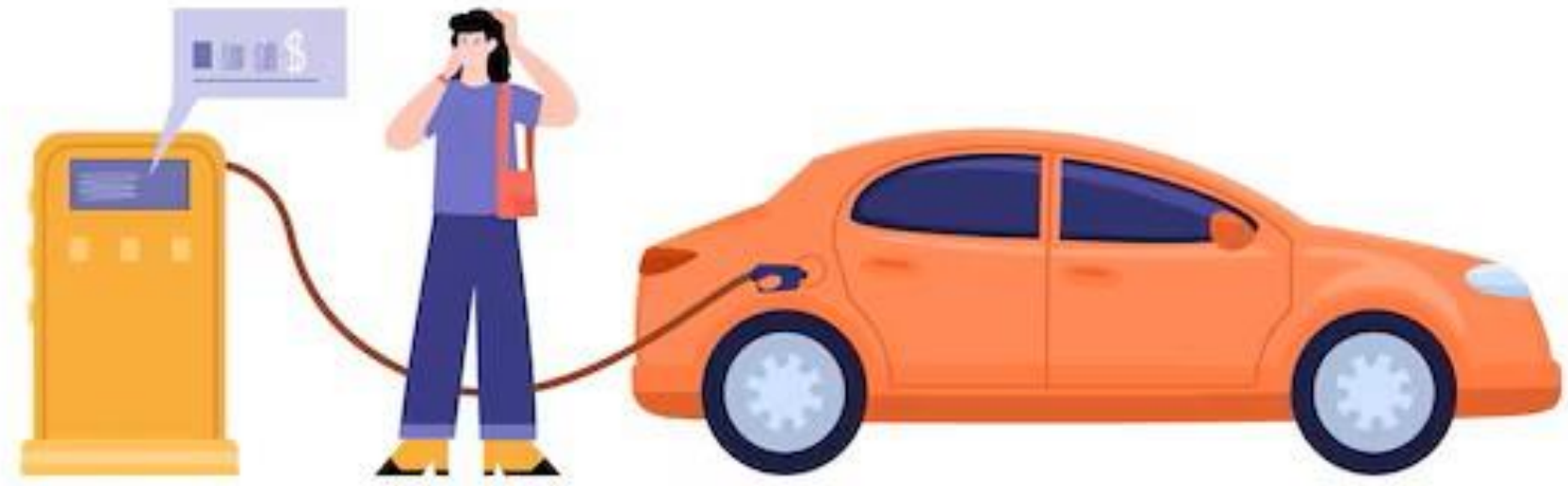
Charging
two ways, one socket:

Note:
Pre-2017 DC socket (CHAdeMO)
Now a legacy standard

Top images: https://zecar.com/resources/byd-seal-charging-guide
Bottom image: B Gaton

Key Point #1

- In any 24hr period: the average car is parked 95% of the time*.
- So why waste time charging ***during*** a trip?



***Reference:** https://www.reinventingparking.org/2013/02/cars-are-parked-95-of-time-lets-check.html
Image: https://www.freepik.com

Key Point #2

"Not in Kansas any more".

(a) Private charging will predominate. (roughly 80% of all charging)

(b) i.e. EV transition DOESN'T need 1:1 swap of fuel bowsers to car chargers.

(c) Best public places to recharge often different to fuel station locations.

Public recharging model differences:

- **Cities:** multiple AC and DC options, more diffuse, smaller footprint per site;
- **Roadhouses:** mostly very fast DC, expansion potential for more food and break options;
- **Country towns**: mix of medium-fast DC and AC chargers, depending on dwell-time.

‘Refuelling’ reinvented

Think plug-n-ignore ‘mobile phone’ model

NOT

find, stop and act as a

‘fuel pump attendant’

Key Point #3

EVs use a mix of charging options

AC:

Portables

Image: EVSE Australia

Image: EVolution

Hard wired

Image: JetCharge

Image: EVSE Australia

Image: Tesla

DC (fast-charge):

Image: Tritium

Image: ABB

What charger do I NEED at home?

1. Less than 100km in a day
   - Overnight charge @ 2kW: 100km charged in 8hrs
   - $500 up installed. (Must go back to switchboard on own circuit).
   - BTW: 15A outlet (same cost) will add almost 200km in 8hrs.

2. Within range of one car charge/day (Kona = 400+km)
   - Overnight @ 7kW: 100km in 2 hrs/full charge by morning
   - $750 up (plus EVSE) installed.
   - Options for solar-only charging, control by Apps, etc

Ch (charger)

Rule of Thumb #2:

If you need to home charge more than 4 hrs at a time, more than twice a week: go up a size in charging.

Typical outlet example	Maximum kW supplied	T		for 100km harged[a,d]
AC charging				
10A power point 	2[b]	8 h	50	20 m
15A power point 				
Home charger 				m
	22[c]			

Rule of Thumb #1:

Charger kW = km charged in 10 min

Examples:
2 kW portable charger: 2 km in 10 min
350 kW charger: 350 km in 10 min

References/further information:

Notes to table:

a. At 15kWh/100km efficiency
b. Single phase
c. Three phase
d. Theoretical at maximum kW rate. DC kW charging rate varies with state of charge and other factors

No off-street parking? What NOT to do!

Image: Keith Bensley (Sawtell, NSW)

Private AC on-street parking solutions:

Netherlands: ChargeArm

Merri-bek council trial:
Vehicle Charge Solutions Australia
https://www.vcsa.au/

Some Melbourne councils: Kerbcharge https://www.kerbcharge.com.au/

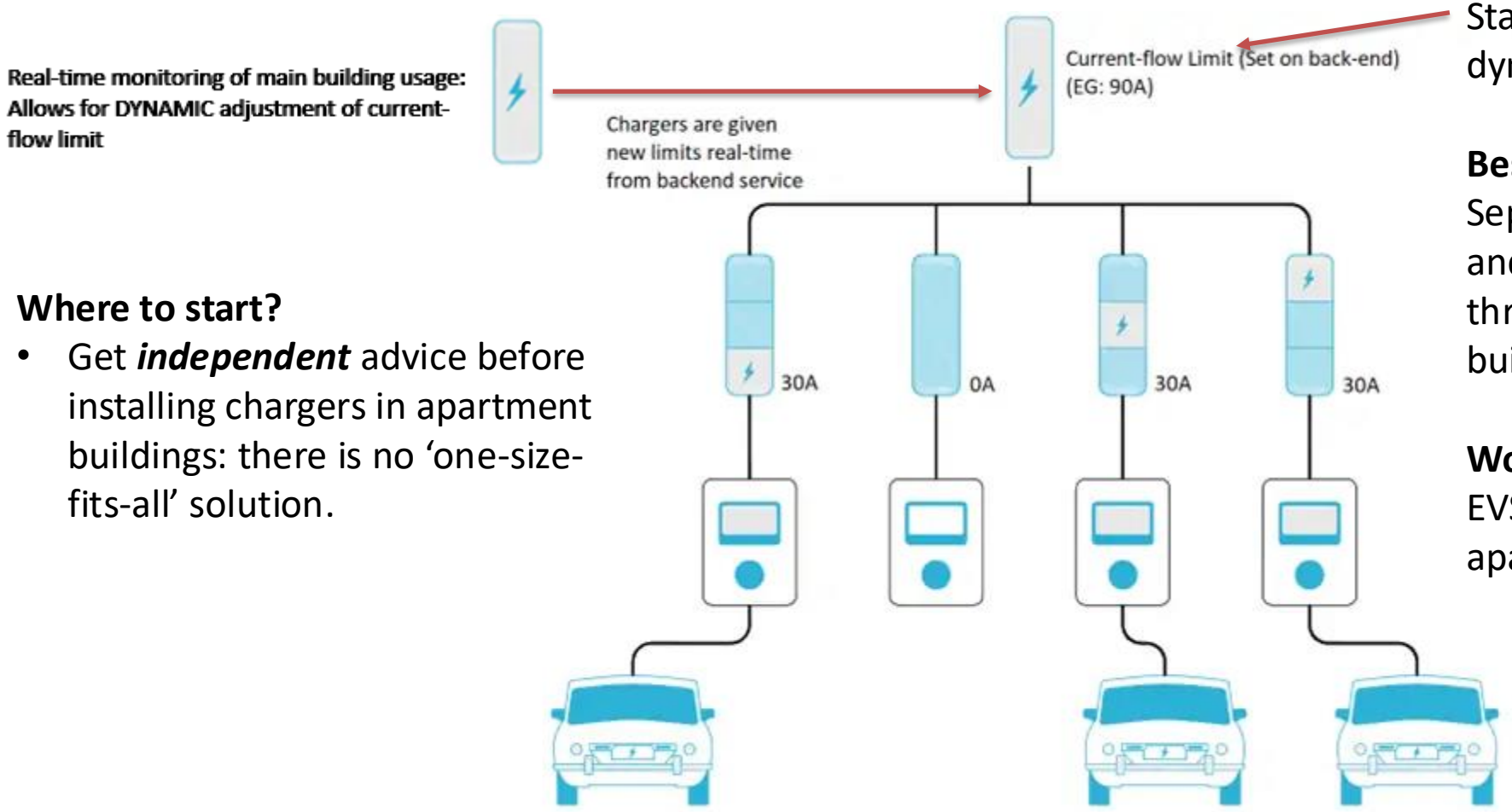
UK: Kerbo Charge

Public AC on-street parking solutions: NSW public AC chargers trial

Image: City EV

Apartments: long-term

Load sharing and load management are key



Static limit options
dynamic limit options

Best practice:
Separate car charging sub-board and dynamic control of EVSEs through monitoring of overall building load at main board level.

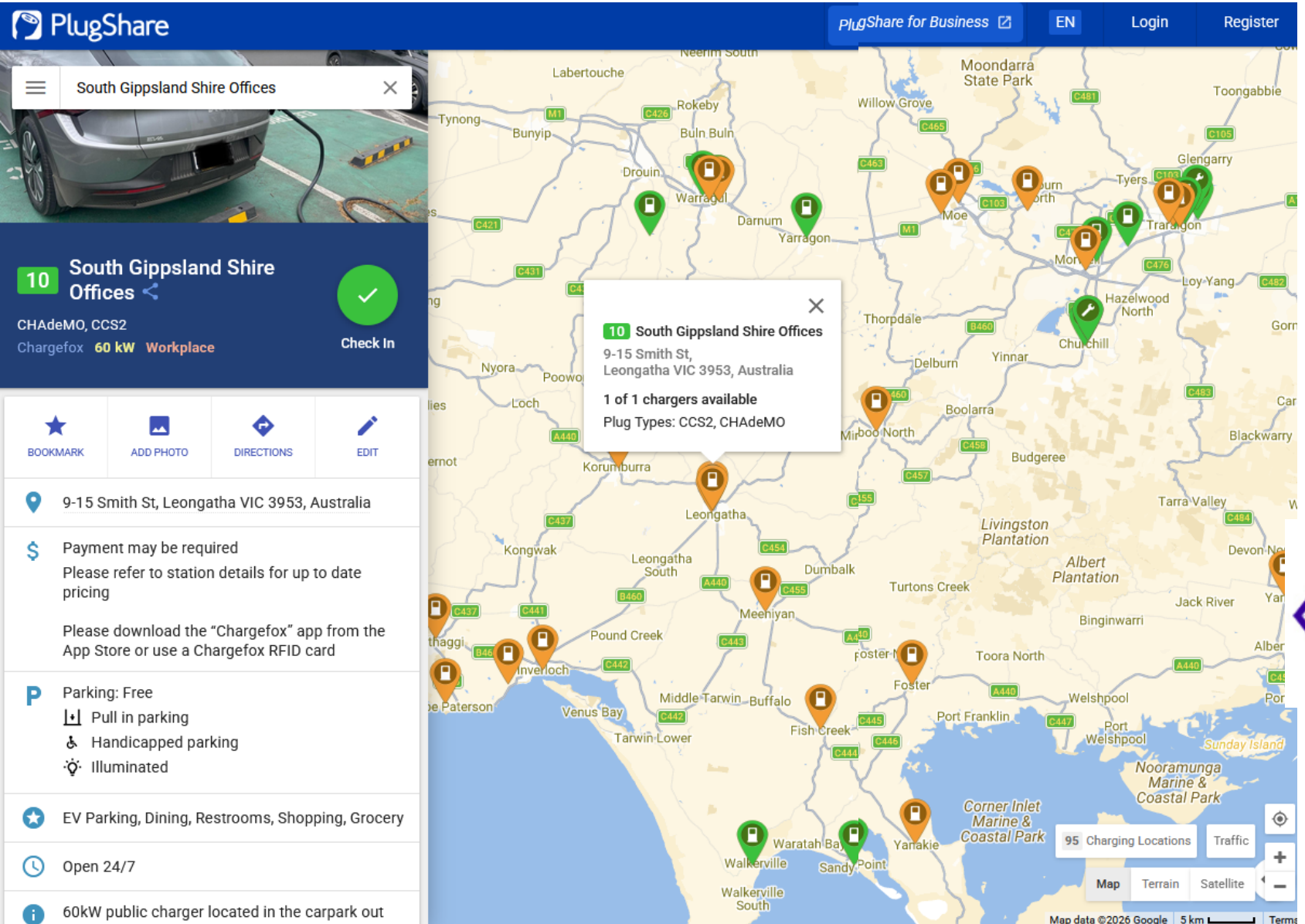
Worst practice:
EVSEs fed from individual apartments.

Where to start?

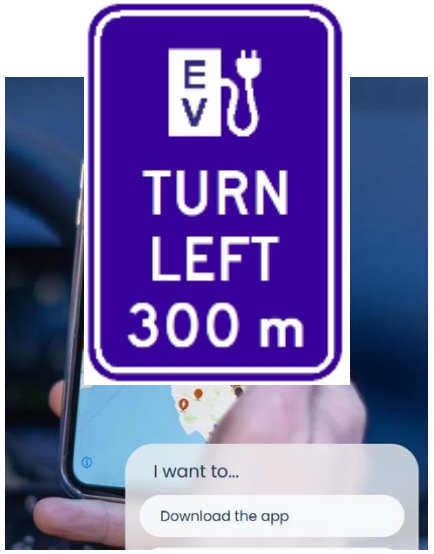
- Get ***independent*** advice before installing chargers in apartment buildings: there is no 'one-size-fits-all' solution.

Image: (adapted from) https://www.egenelectrical.com.au

Finding charge stations:



https://www.plugshare.com/



ox.com/

https://ampcharge.ampol.com.au/

https://www.bp.com/en_au/australia/home/products-services/bppulse.html

How far can I go on a charge? (Range estimates)

Beware: one of three test standards may have been used.

Vehicle	NEDC (Australia)	WLTP (Europe)	US EPA
	Range estimates in kilometres (km)		
Nissan Leaf: 40 kWh	315	270	240
Hyundai Kona: 64 kWh	557	484	415
BYD Atto: 3 50 kWh	410	345	Not sold in US
Volvo C40 AWD: 78 kWh	500	432	364

1. **NEDC = Old European standard/still Aust standard. (WLTP coming July 2026)**
   Commonly around 30% too high. **(Same, or worse, for Chinese CLTC)**
2. **WLTP = New European standard (since 2017).**
   Very close to mainly city/middle to outer suburban use.
3. **US EPA = United States Environmental Protection Agency**
   Very close to mainly middle/outer suburban and regional driving.

More detail:
Renew ed. 155 or EVchoice.au

Coming trend: V2X

❶ V2L: Vehicle to Load → **CCS2: AC**

❷ V2H/B: Vehicle to Home/Building

❸ V2G: Vehicle to Grid

} **DC**

Currently:

a) Many new cars offer V2L now

b) Many new cars arriving now V2H/G capable (but not enabled)

c) Some CCS V2H/G connection boxes approved and available

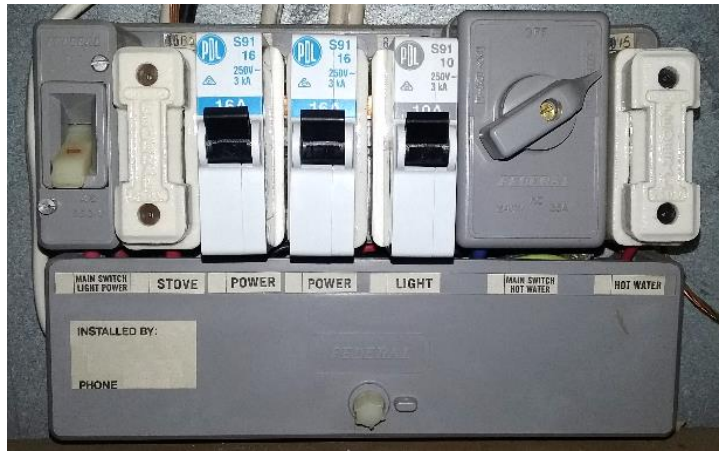
d) Hold-up is the vehicle manufacturers

Image: Nissan Australia

Futureproofing your electrical installation

- Smart chargers may be mandated in the future
- V2G options coming (sometime 2026??)
- Moving to all-electric homes
- i.e: when doing electrical work: PLAN AHEAD
  - If changing the switchboard, 2 rows & 24 slot minimum
  - install cable for 32A, even if using a standard power point for now.
  - Run data cables between charger and switchboard (or to data hub).

Other EV transition practicalities:



- Current switchboard and street supply cable capacities.
  - ➢ **See ReNew magazine, edition 143.**
- Do you have somewhere to charge off-street?
  - ➢ **See Renew magazine edition 145.**
- Choosing the right electricity tariff.
  - ➢ **See ReNew magazine, edition 144.**
- ‘Smart-ish’ or ‘Dumb’ charger choice (Fully ‘Smart’ yet to come).
  - ➢ **See Renew Magazine edition 156 (July – Sept 2021)**
  - ➢ **https://thedriven.io/2023/08/22/what-is-an-ev-smart-charger-and-can-i-buy-one-now/**
- Lead to use public ‘BYO’ chargers.
- Useful to carry a higher power charger for remote area travelling.

Renew articles also available at EVchoice.au

Passenger cars

Honda Super ONE: **H2 2026**
Micro. Range: 200km?
Price: $30k?? TBC

Nio Firefly: **H2 2026**
Light. Range: 300 km (TBC)
$40k?? TBC

Leapmotor B05: **Mid 2026**
Small. Range: 420 km?
Price $45k??

Mazda 6e: **Q2 2026**
Medium. Range: 560 km
$55,000 + ORCs

Polestar 5: **H2 2026**
Large. Range: 678 km
$TBC, but comfortably over $100k

Small SUVs

Suzuki e-Vitara: **June 2026**

Small SUV. Range: 344/395 km

$47k, $57k

MG4 EV Urban: **HERE! 2026**

'Small' SUV. Range: 325/415 km

$32k, $35k

Skoda Epiq: **Q4 2026**

Small SUV. Range: 315/430 km

Price: TBC

Medium SUVs

Mazda CX-6e: **Q4 2026**
Medium SUV. Range: 475 km
$50k + ORCs

Volvo EX60: **Q4 2026**
Medium SUV. Range: 620/810 km
$90k + ORCs

MG S6: **H1 2026**
Medium SUV.
Range: 529/484 km (2WD/AWD)
$60k+ORCs (TBC)

Deepal S05: **H1 2026**
Medium SUV
Price: $TBC

Smart #5: **H1 2026**
Medium SUV. Range: 550 km
Price: $TBC

Light Commercial BEVs

Kia PV5 Cargo: **H2 2026**
Range: 295/412 km (TBC)
NZ$79,990 OTR, Au $93k +ORCs. (!??)

Toyota Hilux BEV: **H2 2026**
Range: 240 km; 1600kg towing
$75k+ORCs

Mg U9 ute: **Q4 2026 (TBC)**
Range: 300 km (TBC); 3500kg towing
$TBC

Victory light truck. **2026?**
Range: 240 km (TBC)
$45k on-the-road??

Pickles Buy Sell Services About Pickles

Cars

2016 TESLA Model S

70 Sportback 5dr Reduction Gear 1sp AC235kW

There's no need to buy new: Buying a second-hand EV

What should I look for when checking out a potential second-hand EV purchase? Bryce Gaton explains the ins and outs of shopping around for a used EV.

For a BEV (battery electric vehicle), in place of the internal combustion engine (ICE) and its associated fuel, exhaust, emissions control and cooling systems are the new components of an electric drive system. (These being the main battery, electric motor, charger, charging socket/s and all the EV associated electronic controls).

Remember though, the electric propulsion parts are only roughly one third of the car: the rest of it is identical to its ICE powered predecessor. Consequently, many of the pre-purchase checks needed for a second-hand BEV remain identical to those needed for a second-hand ICE vehicle. For a PHEV (plug-in hybrid electric vehicle) or HEV (hybrid electric vehicle), these checks include all the ICE ones, plus additional EV ones.

Whilst an in-depth knowledge of either BEV or ICE systems is needed to diagnose and fault-find such systems, the average car buyer can make a reasonable assessment of their fitness.

The ZEO Nissan Leaf is the cheapest second-hand EV readily available in Australia. Despite being up to nine years old and with short range compared to modern EVs, they still command good prices, rarely being found for less than $16,000. Many other EVs can sell for as much second-hand as they do new, such is the demand for EVs in Australia, although prices will drop once new lower-priced EVs such as the BYD Dolphin enter the Australian market.

Image: EurovisionNim/Wikipedia (CC BY-SA 4.0).

The general inspection categories for each EV type

- Differences between ICE and BEV

The biggest changes are in what you don't need to check. For a BEV, these include the more than one radiator for the electric motor, controller and/or battery cooling).

- Operation of charging system(s)
- Condition of charge socket(s)
- Portable EVSE—existence, condition and operation
- Operation in different driving modes (as fitted to the vehicle)

EV

EVs catch fire a lot?

The headline:

The facts:

US vehicle fires by the US insurance company *AutoinsuranceEZ.com* found the following:

Hybrid vehicles: 3,474 fires per 100k sales
Petrol vehicles: 1,529 fires per 100k sales
Electric vehicles: 25 fires per 100k sales

Nissan:
15 years of Leaf manufacture (and over 600,000 sold) – NO battery fires or thermal runaway events. (Kazuhiro Doi, Nissan)

EVs “weigh significantly more than ICE cars” … and damage our roads lots more??

Make/model	ICE tare mass (kg)	BEV tare mass (kg)	% increase: BEV to ICE
Hyundai Kona	1450	1615 (48.6 kWh) 1698 (64.8 kWh)	11% 17%
Genesis G80	2023	2325	15%
Genesis GV70	2038	2310	13.3%
Volvo XC 40 recharge	1760	2001	14%

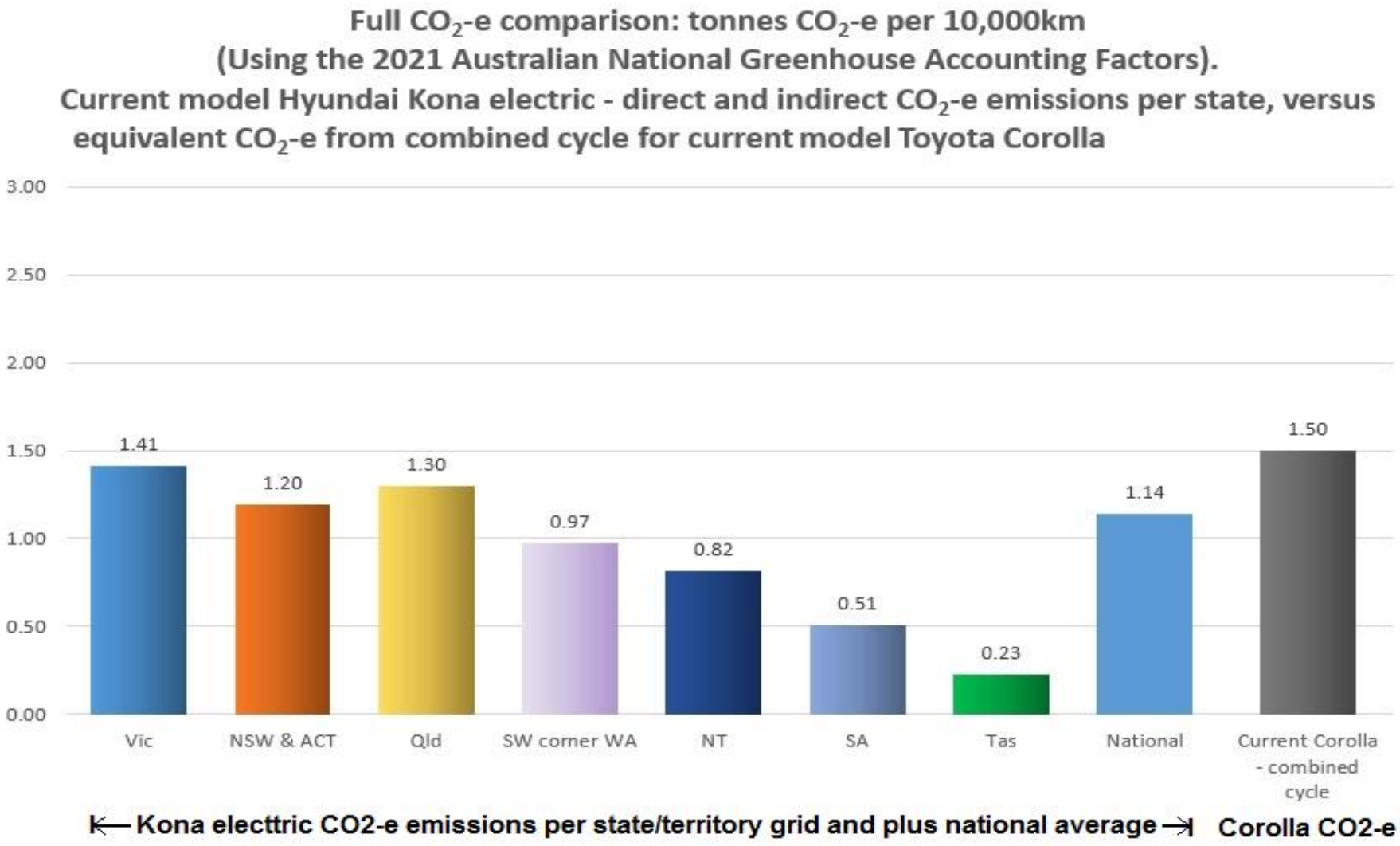
https://thedriven.io/2024/05/03/are-evs-really-much-heavier-than-their-ice-equivalents/

Australian Government
Department of Industry, Science, Energy and Resources

Are EVs are more polluting than ICE cars?

National Greenhouse Accounts Factors

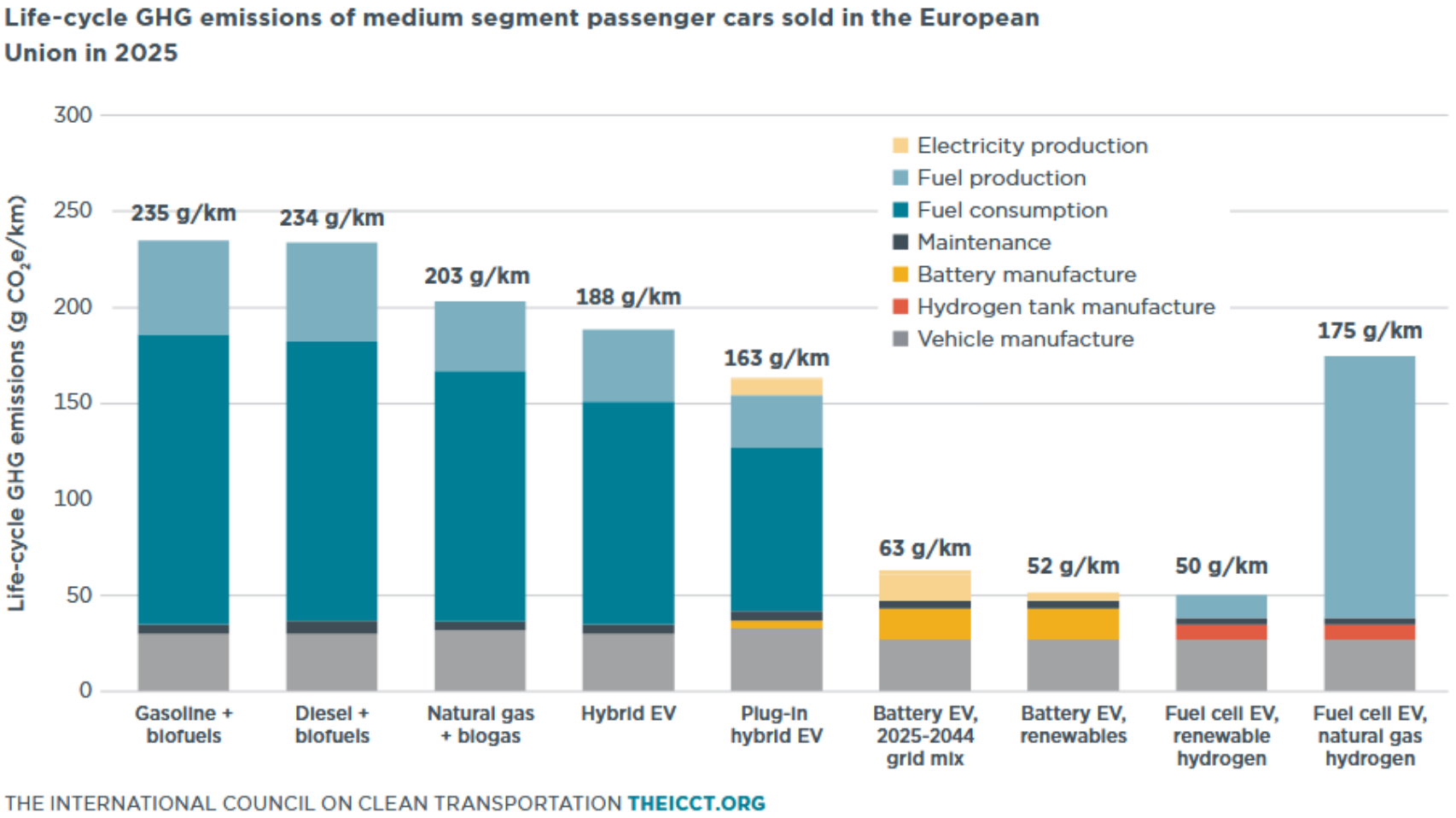
Australian National Greenhouse Accounts



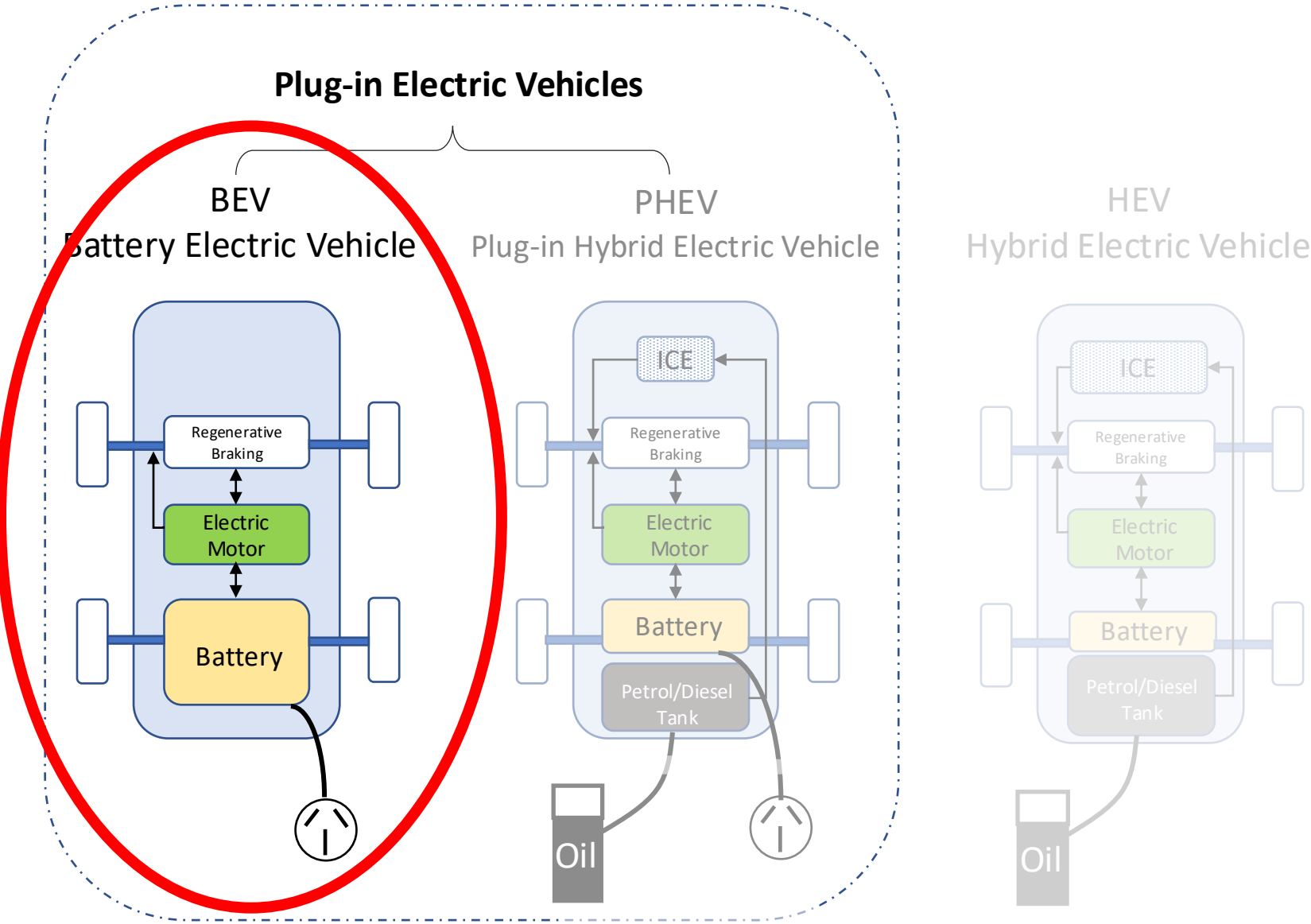
*Calculations done to Department of the Environment and Energy National Greenhouse Accounting methodology using the 2021 NGA Factors data. For full (2021 data) article: see ReNew 159, April-June 2022).

But what about the full EV life cycle?

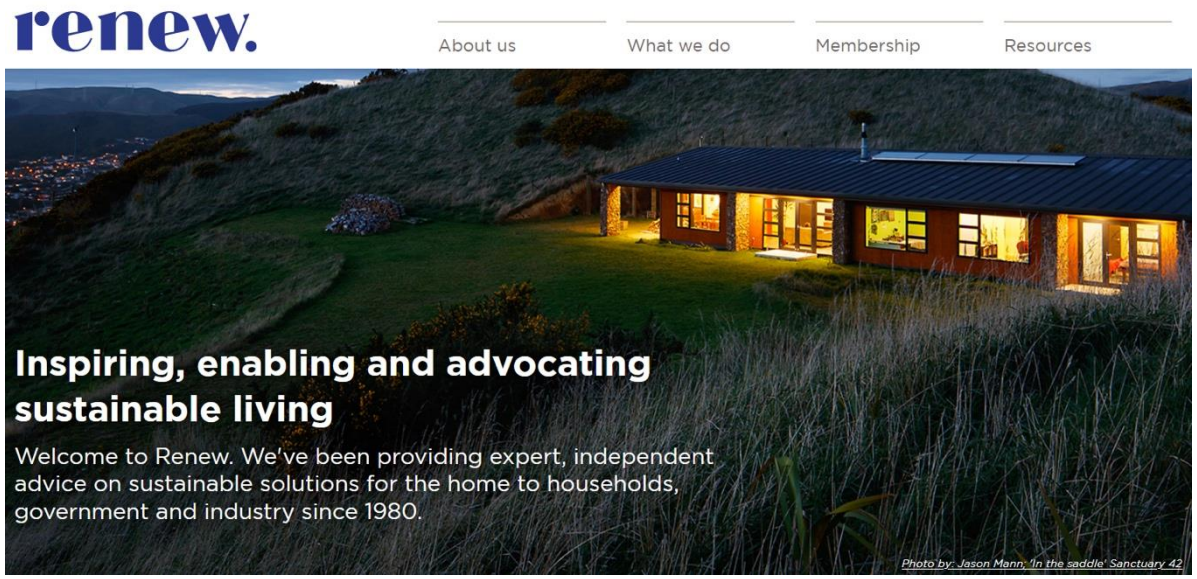
- US: Union of Concerned Scientists report 6 – 16 months driving to pay back manufacturing emissions.
- Europe: 1 to 2 years by the International Council on Clean Transport (ICCT).
- Getting better as manufacturing moves to renewable sources: Volvo, Polestar moving to zero carbon debt as it leaves the factory!



A mix of tech is needed?



To find out more: Australian organisations



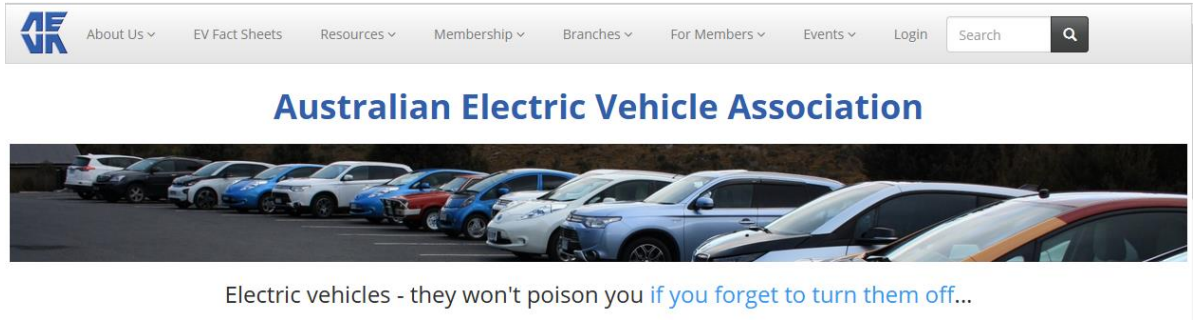
https://renew.org.au/

Edition 175: (Apr – Jun 2026)

- Finding public chargers

Edition 176: (Jul – Oct 2026) COMING

- 1st owners guide to buying & driving EVs

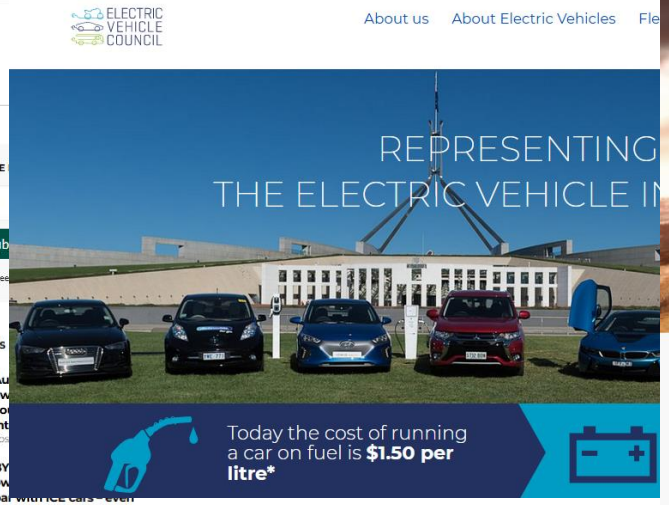


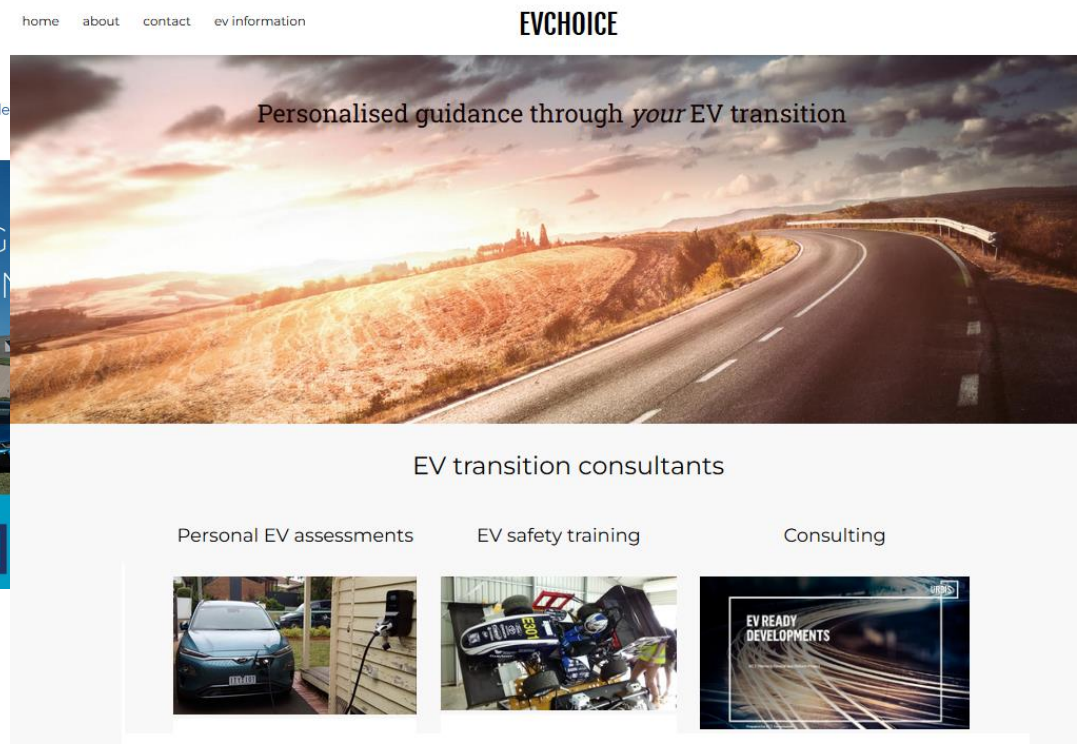
https://www.aeva.asn.au

AEVA discussion forum: (free to join)
http://forums.aeva.asn.au/

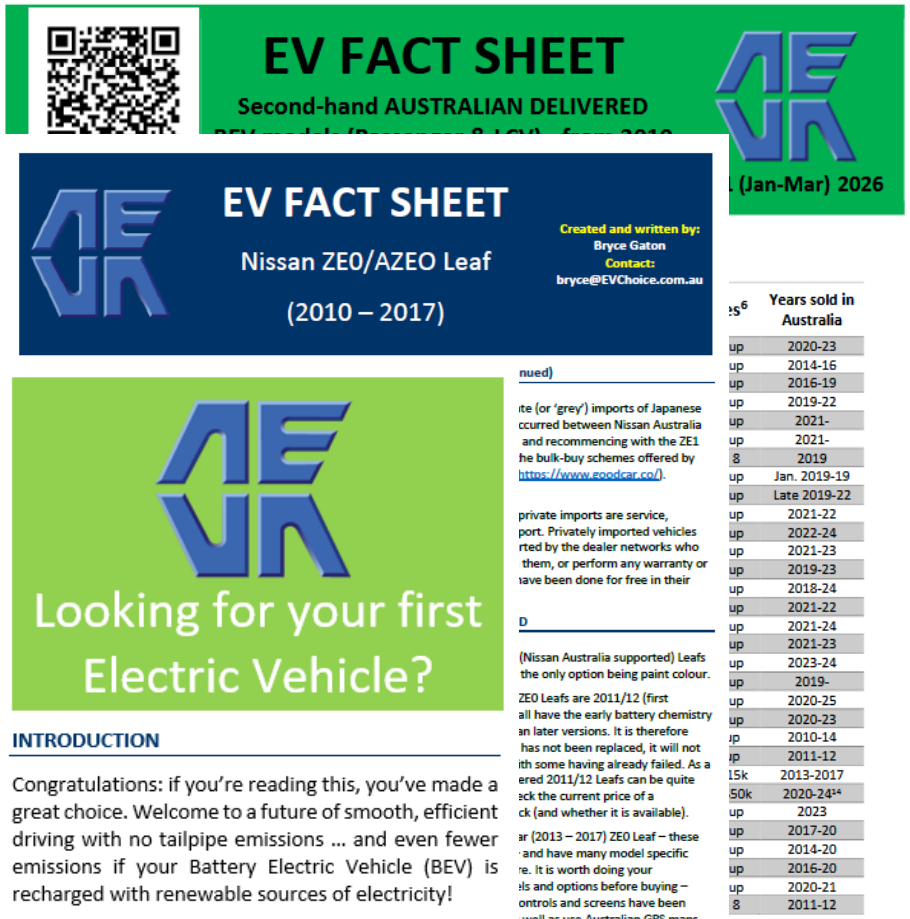
To find out more: Australian websites

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



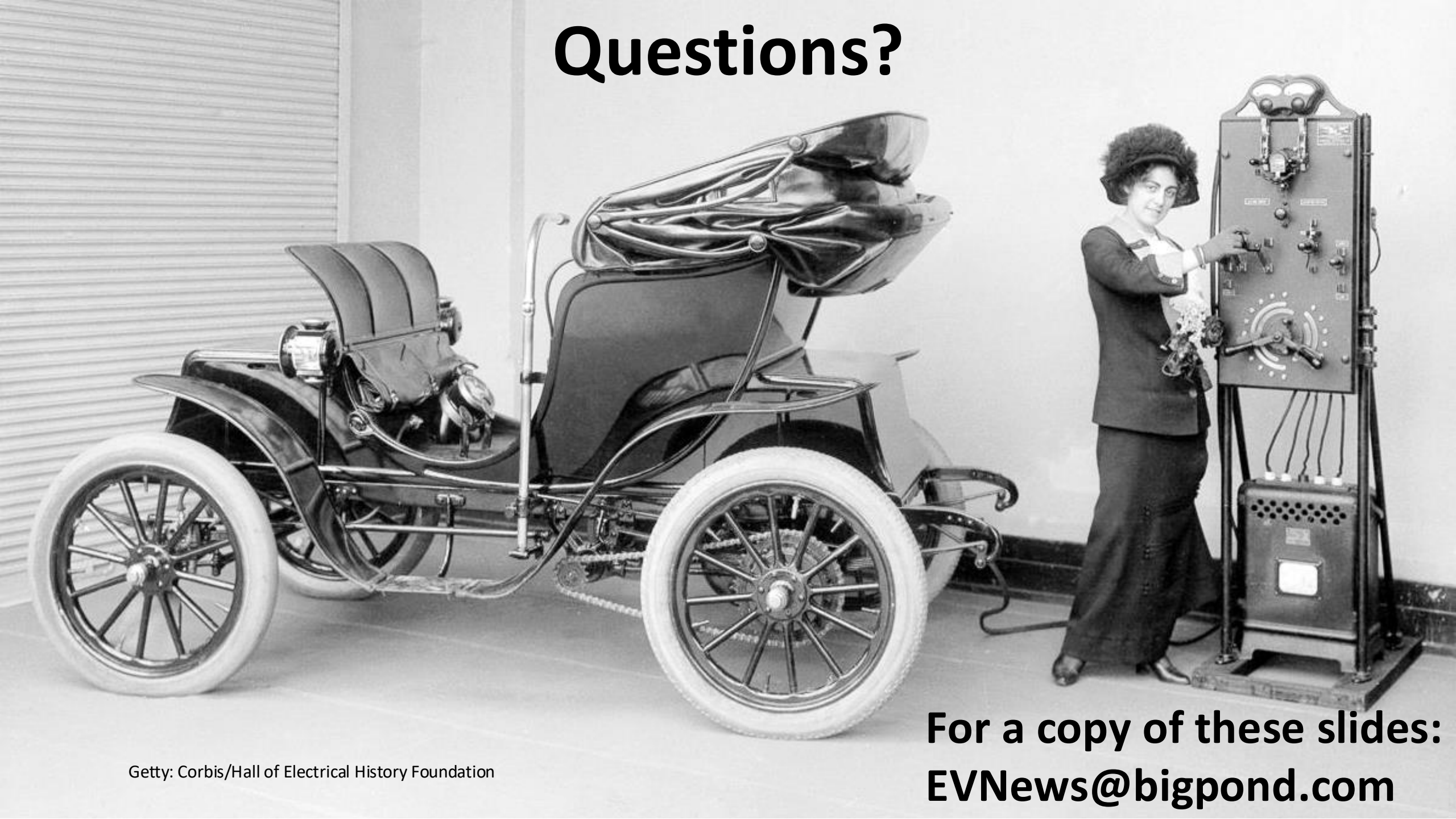


EV information: AEVA/EV Choice Fact Sheets



aeva.au/fact-sheets

Questions?



Getty: Corbis/Hall of Electrical History Foundation

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