Electric Vehicles

Clive Attwater, National Vice-President
Australian Electric Vehicle Association

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Future savings	• As cheap as ICEs by about 2025, eventually cheaper

Drivers of EV uptake

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Really bad air quality made it necessary:

- California Air Resources Board (CARB)
- European Union
- Chinese cities

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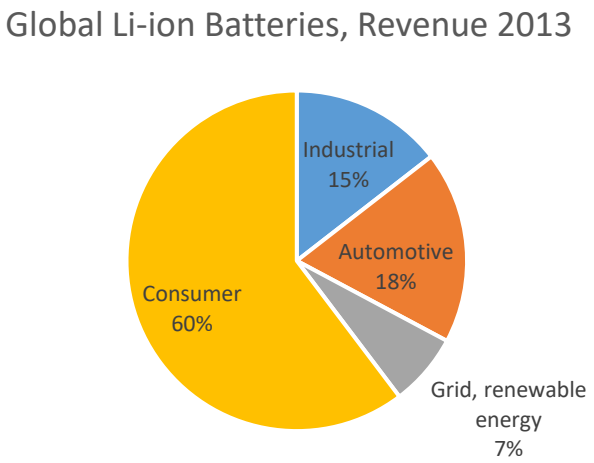
Li-ion battery market

- Until recently: laptops, smart phones, power tools dominate



Source: Frost & Sullivan, 2015

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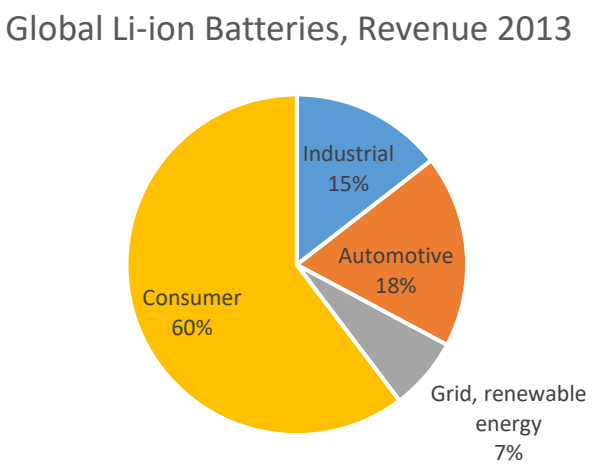
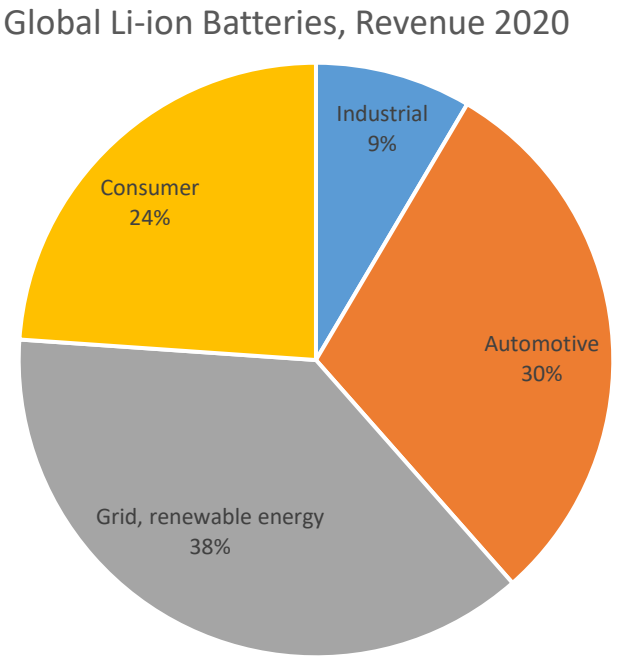
- 2020: load management, renewables storage will dominate





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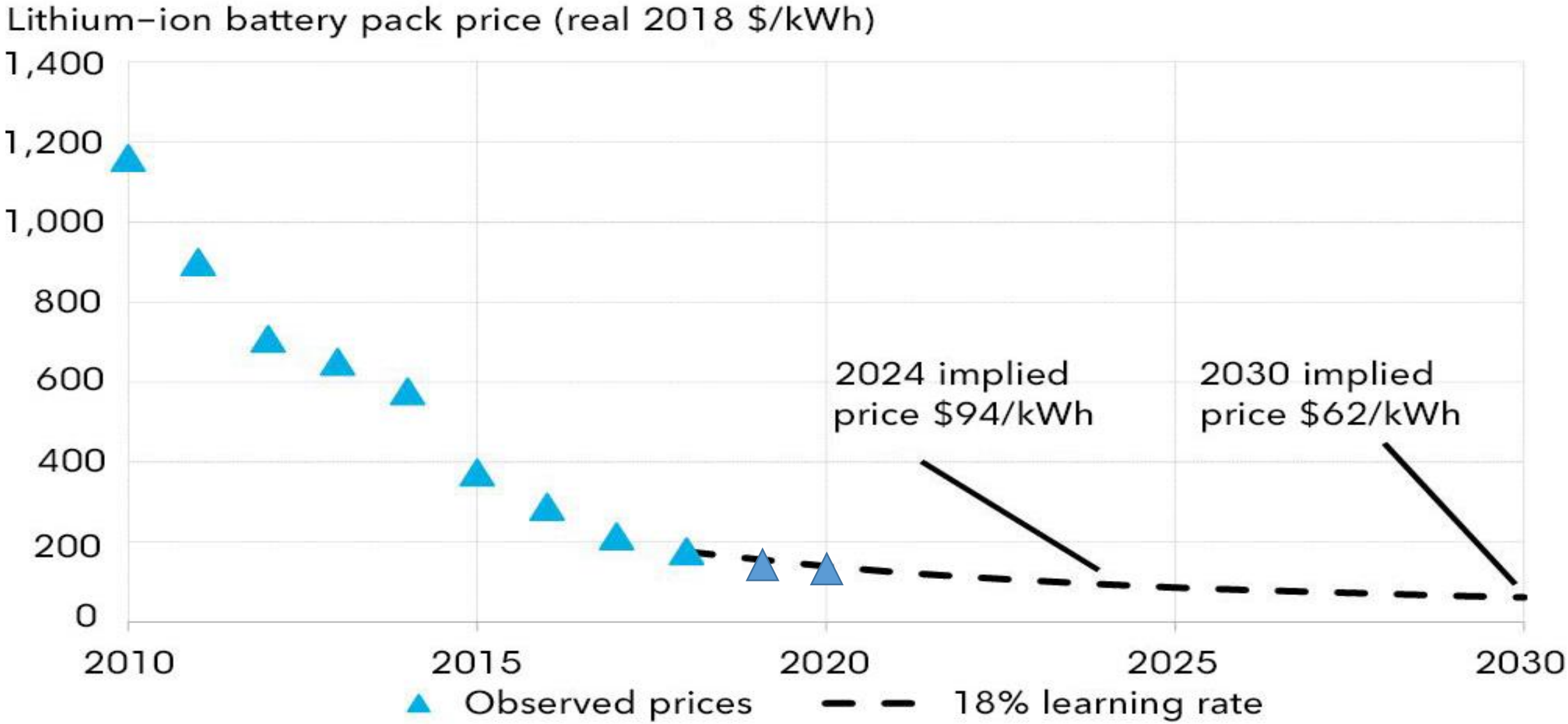
SA Big Battery 100MW/129 MWh

Hornsdale Power Reserve
Tesla's "BFB", opened December 2018

What’s inside!

Battery price curve



Source: BloombergNEF

Context

EVs globally:

- >10 million on the road today
- Strong global growth driven by incentives, regulations
- China world's largest EV market and manufacturer
- Norway 78% of newly registered cars are electric
- Fast charge networks now cover many countries and are growing in Australia

Context

But in Australia:

- 15,000 EVs in entire country; NZ has more…
- About 220 fast charge stations in Australia (only 45 three years ago)
  Compare: 148 in Estonia in 2016 (2/3 the size of Tasmania)
- Few subsidies, incentives, familiarity or infrastructure

  …which leads to low sales volumes,
  … and poor EV profits for car makers in Australia
- Therefore, limited range of models available – but improving …

When will EVs be widespread?

Five conditions for widespread adoption

1. Familiarity (awareness, ‘proven’ technology, ease of use)
2. Adequate range (min 250 km)
3. Variety of models (sedans, wagons, SUVs, utes, vans, trucks…)
4. Capital cost competitive (even though operating costs ~half)
5. Perception of adequate charging infrastructure (dots on map)

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   Tas, NSW nearly ‘covered’; other states developing

AC Charging infrastructure – Plugshare.com

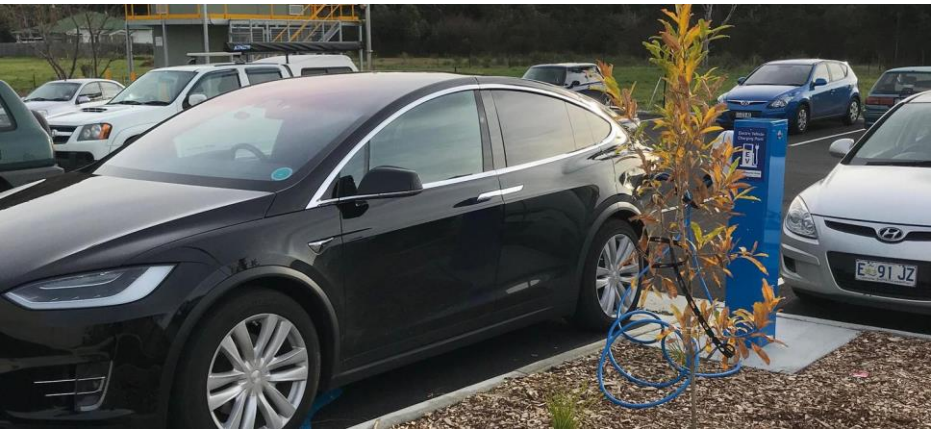
Sites allowing EVs to charge:

- Caravan parks
- Attractions
- Cafes/restaurants
- Wineries
- Accommodation
- Local government

These chargers are mostly free but very slow

Some are simply 15A power points

AC slow chargers



Australian Fast Charging Network

Growing strongly but still many areas not well covered. $16.5 million ARENA immediate funding plus more to come

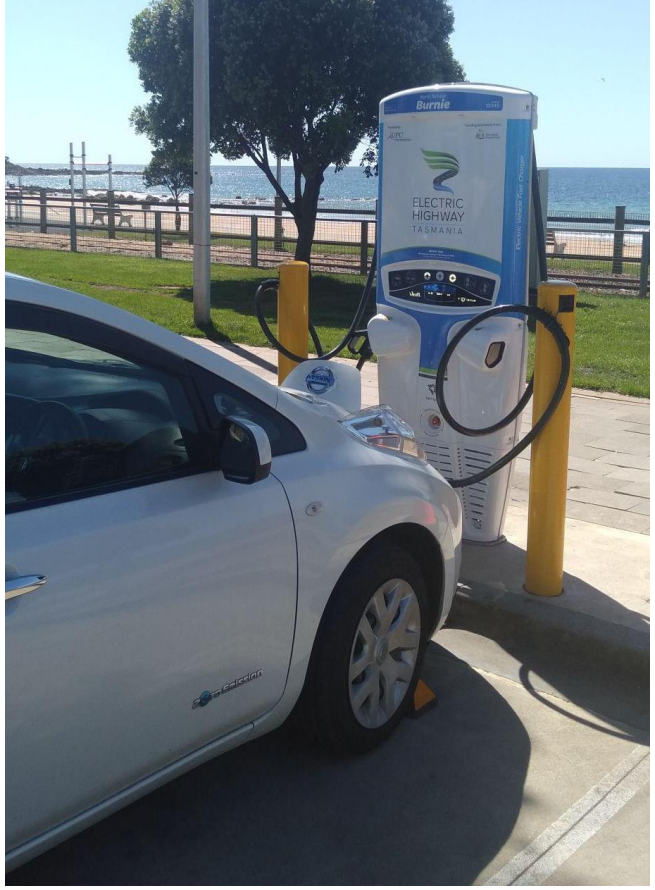
Mostly for a fee though a few are fee

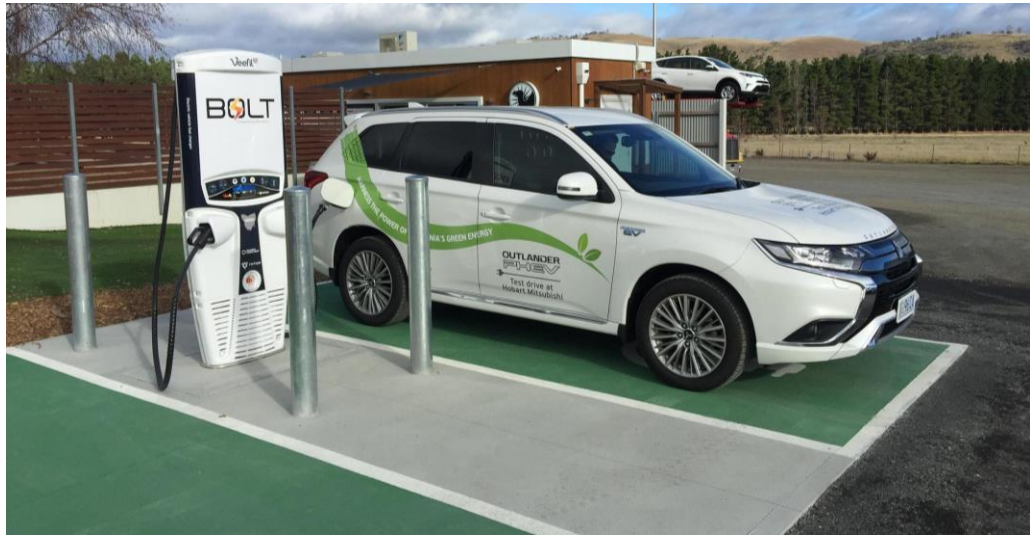
Most expensive way to charge: about the price of petrol!

Payment via and app or RFID card.
A few sites take credit cards

Several different networks so need to have all loaded for the route you are travelling.

DC Fast chargers (sample)





What to look for in an EV

Get the right car for your needs (normal stuff):

- Seating, boot space, roof racks, towing, ease of entry, safety, etc.

EV specific considerations:

- **Range**: What do you really need?
- **Charging**: Can you charge at home?
- **Battery life**: How long will it last?

Range: What do you really need?

- Average daily journey = 40 km
- Are you average? You may be using an EV:
  - As a second car
  - Local run around only (school run, shopping)
  - Regular predictable commute
  - Regular longer journeys
- If you have private off street parking, usually leave home charged
- Highway driving: Reasonable driving time between stops 2 hrs = about 200 km so 250 km range serves most trips, recharging at rest stops. But you may need to plan your route where chargers less common.

Charging: Can you charge at home?

If you have private off street parking, charge at home

- Cheapest and most convenient option
- Cheapest option: 15A power point (but have the circuit checked)
- Solar is particularly cheap if you can put it on your roof
- With or without solar: switch to off peak tariff

No private off street parking?

- A longer range vehicle allows charging once or twice a week.
- Need to look at local public charging options.
- Practicality varies greatly by location. May be free or may be expensive.

Battery life: how long will it last?

- Longer range batteries last longer: fewer charge/discharge cycles for the distance travelled
- If a used car, get a report on battery capacity, health
- The issue will become less important over time as batteries will get cheaper, more businesses offer reconditioning and replacement
- Treat it well:
  - Charge to 80% for routine use; 100% only if really needed
  - Don’t leave parked fully charged or fully discharged for over ½ a day
  - Avoid excess heat if possible (car paint baked after repair)
  - Use ECO mode

The end