

Electric Vehicle charging

Bendigo Bank employee training

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Objective

To give you enough information about charging for you to operate an Electric Vehicle with confidence



How charging works

CHARGING BEATS REFUELLING



- ✓ Clean and safe, even for kids!
- ✓ Can happen anywhere
- ✓ Plug in and walk away



- ✗ Noxious, volatile chemical
- ✗ Who likes going to service stations?
- ✗ Got to babysit... can't even use your phone!

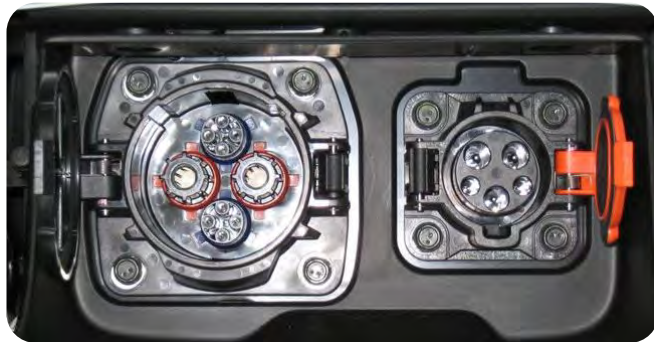
FROM MANY PLUGS TO ONE

Famous Electric Vehicles in our market

2012 – 2022 Nissan Leaf



Hyundai Kona



CHAdeMO

J1772

CHAdeMO

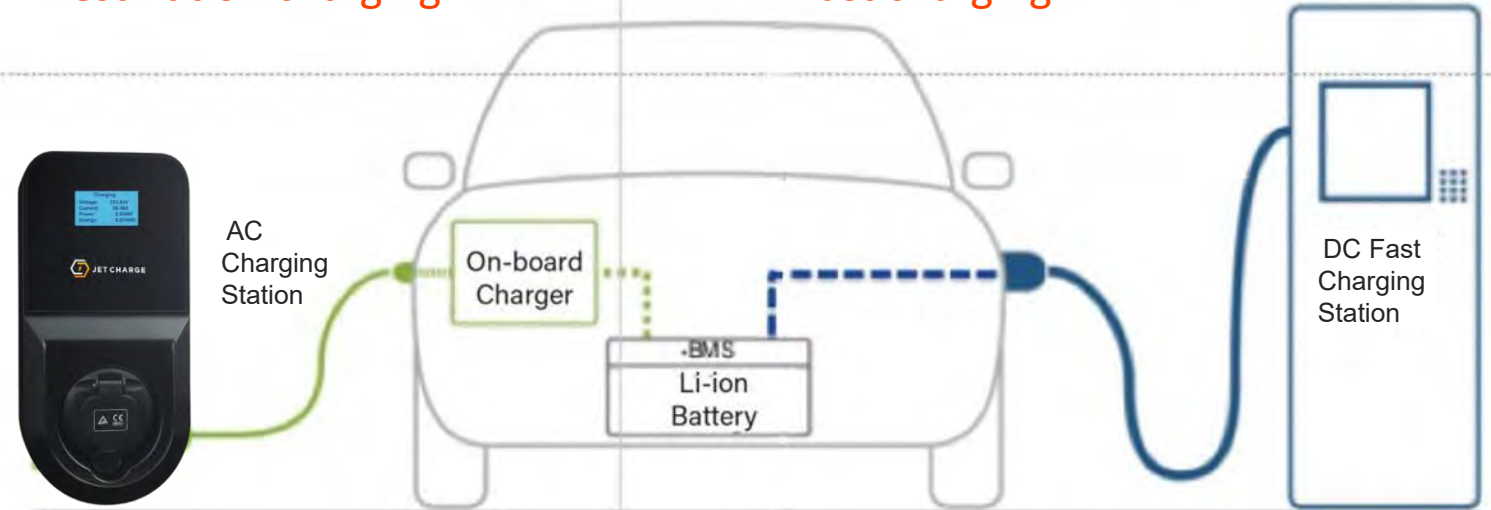
Type 2

Combined
Charging
Standard CCS2

AC vs DC CHARGERS

Alternating Current (AC)
Destination charging

Direct Current (DC)
Fast charging

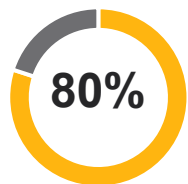


While every EV needs an onboard charger, size constraints reduce charge.

High voltage DC chargers can take a lot of power and feed it directly to the battery.

How long?	Relatively slow ... overnight	Fast ... 10-15 minutes per session
Resembles?	Laptop or phone charging	Traditional refuelling
Where?	At home or business premise... the destination	On the road
Set-up cost?	\$1,500-5,000	\$50,000-350,000

Where do people charge?



PRIVATE CHARGING



PUBLIC CHARGING

Home



Off-street parking space at a house, or parking spaces at apartment complexes

Workplace



Company and employee parking spaces

Highway



Service stations

Public



Shopping centres, multi-storey car parks

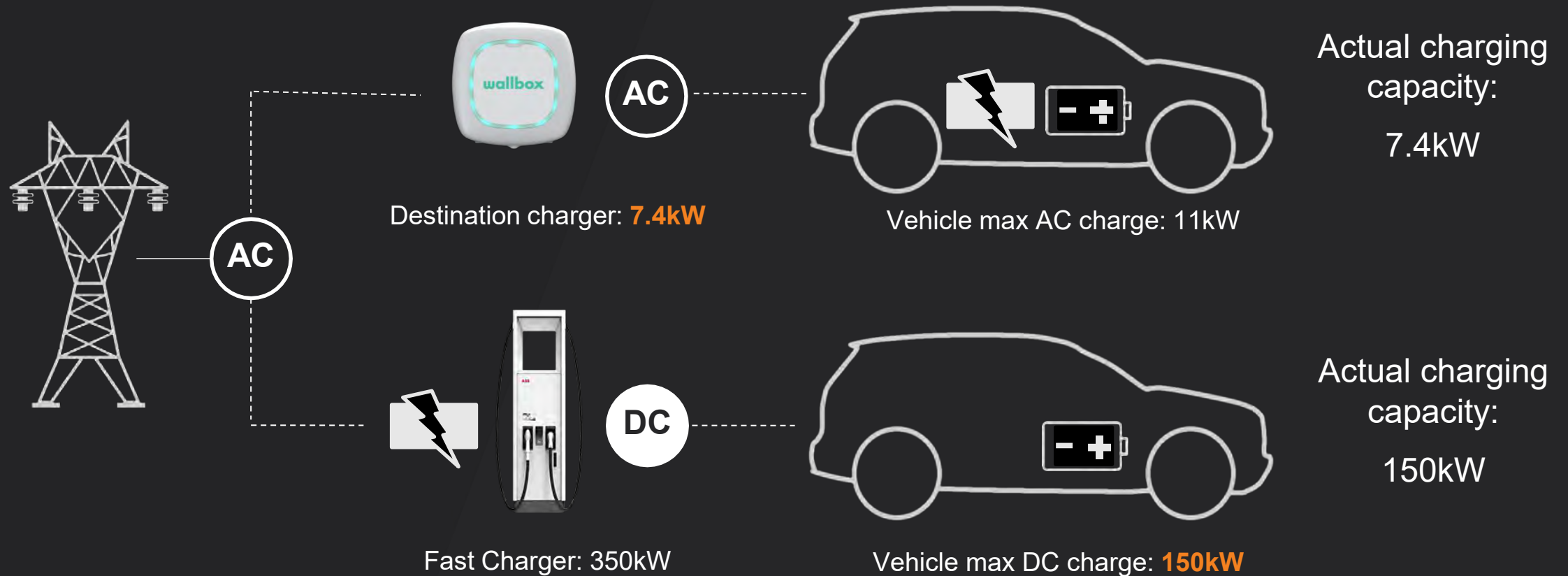
Destination



Destinations including wineries, tourist locations

Actual charging experience

Determined by the weakest link – operating condition also matters



Charging Time

$$\text{Battery Capacity} \div \text{Charge Power} = \text{Hours}$$

Example: $78\text{kWh} \div 11\text{kW (AC)} = 7 \text{ hours... but more realistically... } 54.6\text{kWh} \div 7.4\text{kW (AC)} = 5 \text{ hours}$

Volvo XC40 Recharge total battery capacity is 78kWh, so this calculation is assuming 0-100% charge



For a more realistic charging time calculation, 10-80% charge is recommended. For this example, this means a battery capacity of 54.6kWh

Actual charging time will vary for reasons described on the next page

How long does it take to charge?

Note that the preceding formula provides a rough estimation.

The actual charging time can vary for the following reasons:

1. Charging speed is not constant. Electric vehicles are not continuously charged at maximum power.
2. DC charging is very fast until the battery reaches 80-90% of its capacity, then slows for the remaining 10-20%.
3. Charging speed depends on battery temperature. The ideal temperature for charging is between 20°C and 30°C. If the battery temperature is outside of this range, charging can be slower.

In practice, this variation is rarely a problem.

PORTABLE CHARGER



1 HOUR

PORTABLE
10A @ 230V

5km

10km

100km

200km

1.8 kW

Range Per Hour ~ 9 – 10 km

- With the car OR aftermarket
- Plugs into a standard 10 amp three-pin socket (like a phone or laptop)
- Good for travelling short distances, emergency top-ups
- No smarts (reporting, control etc)

AC “Destination” CHARGING



1 HOUR

DESTINATION CHARGER
32A @ three-phase

DESTINATION CHARGER
32A @ single-phase

PORTABLE
10A single-phase

5km

10km

100km

200km

7 – 22 kW

Range Per Hour ~ 35 – 115 km

- Dedicated charging solution
- With or without cable
- Recommended for ongoing use at regular place of parking
- May or may not be “smart” (reporting, control etc)

INSTALLATION

JET Charge contacts customer within 24 hours of referral



Garage / property overview

Customer supplies photos (examples below)



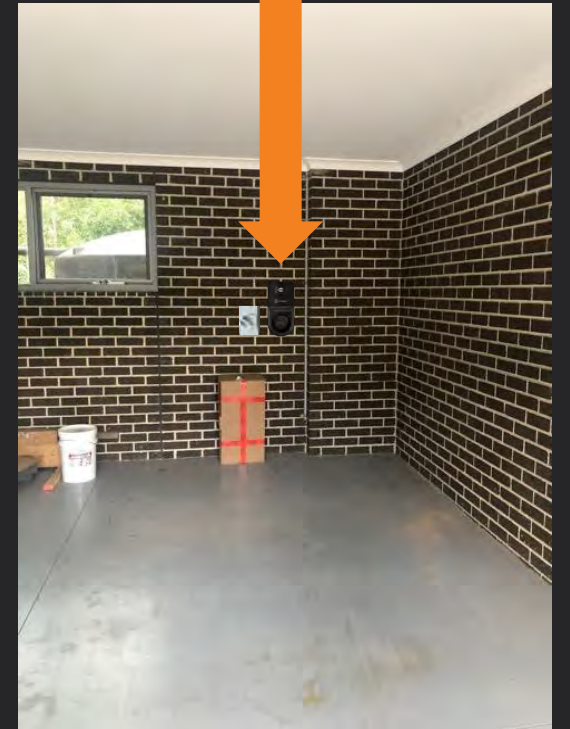
Switchboard in relation to the garage

JET Charge supplies costed proposal for approval



Switchboard Close Up

Install completed 15 business days once approval received



Charger Location



DC “Fast” CHARGING

Fast charging stations provide quick charging when time is of the essence.

They are located on highways and in city hubs.



Charging power range is higher – from 25kW up to 350kW (or higher) – and requires large industrial power equipment:

- Fast... average session 10 – 15 minutes
- Like refuelling a traditional car
- En route and only when needed

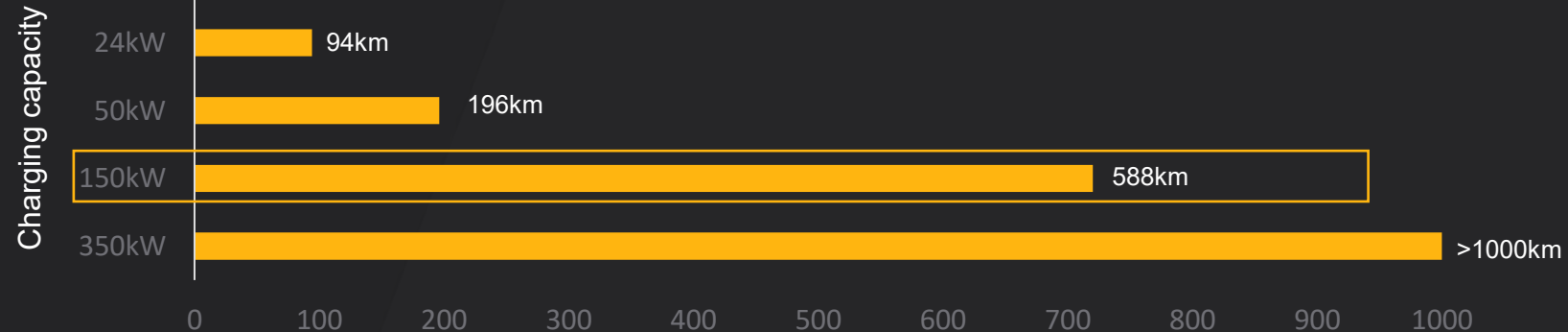
Average range provided in an hour

The difference between AC and DC

AC Charging



DC Charging



* Calculations based on Volvo XC40 Recharge with 78kWh total battery capacity and energy consumption of 25.5 kWh / 100km

** 7.4kW = 32A single-phase and 11kW = 16A 3-phase

CHARGING IN PUBLIC

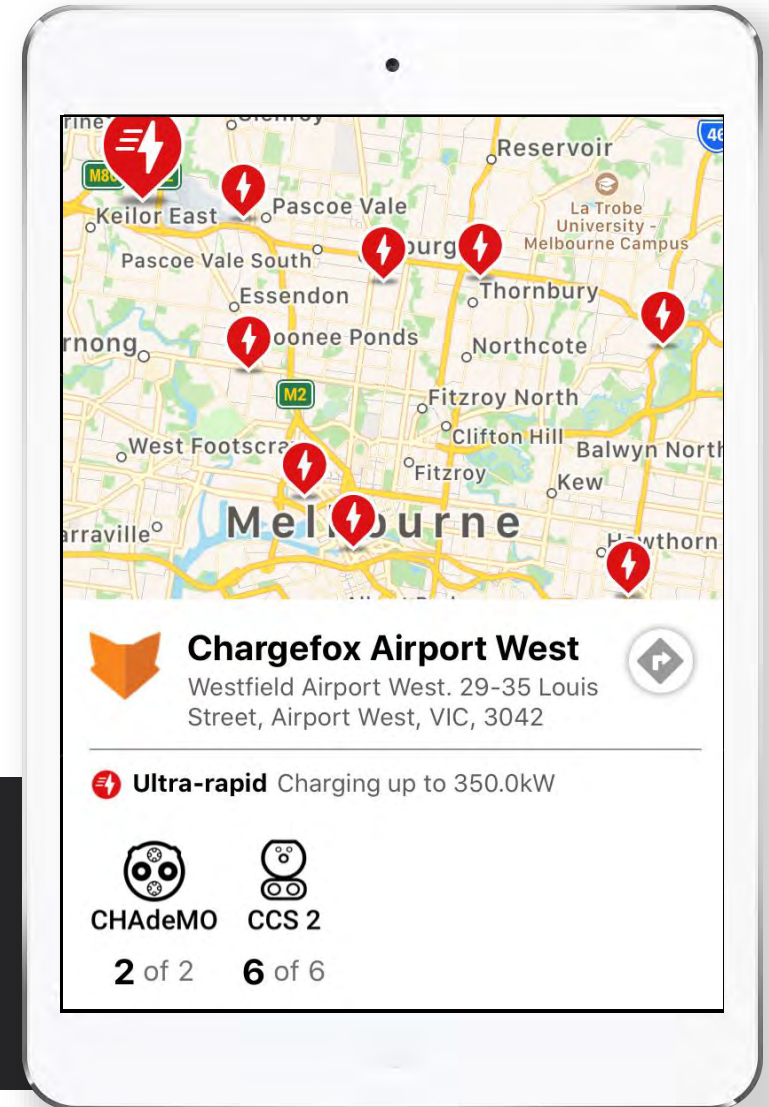
Chargefox is Australia's Largest Charging Network

Other public charging networks include Evie, NRMA and more, all of which are growing.

Most can be paid for by credit card or their dedicated app with an account linked to your employer.

Holistic Charging network

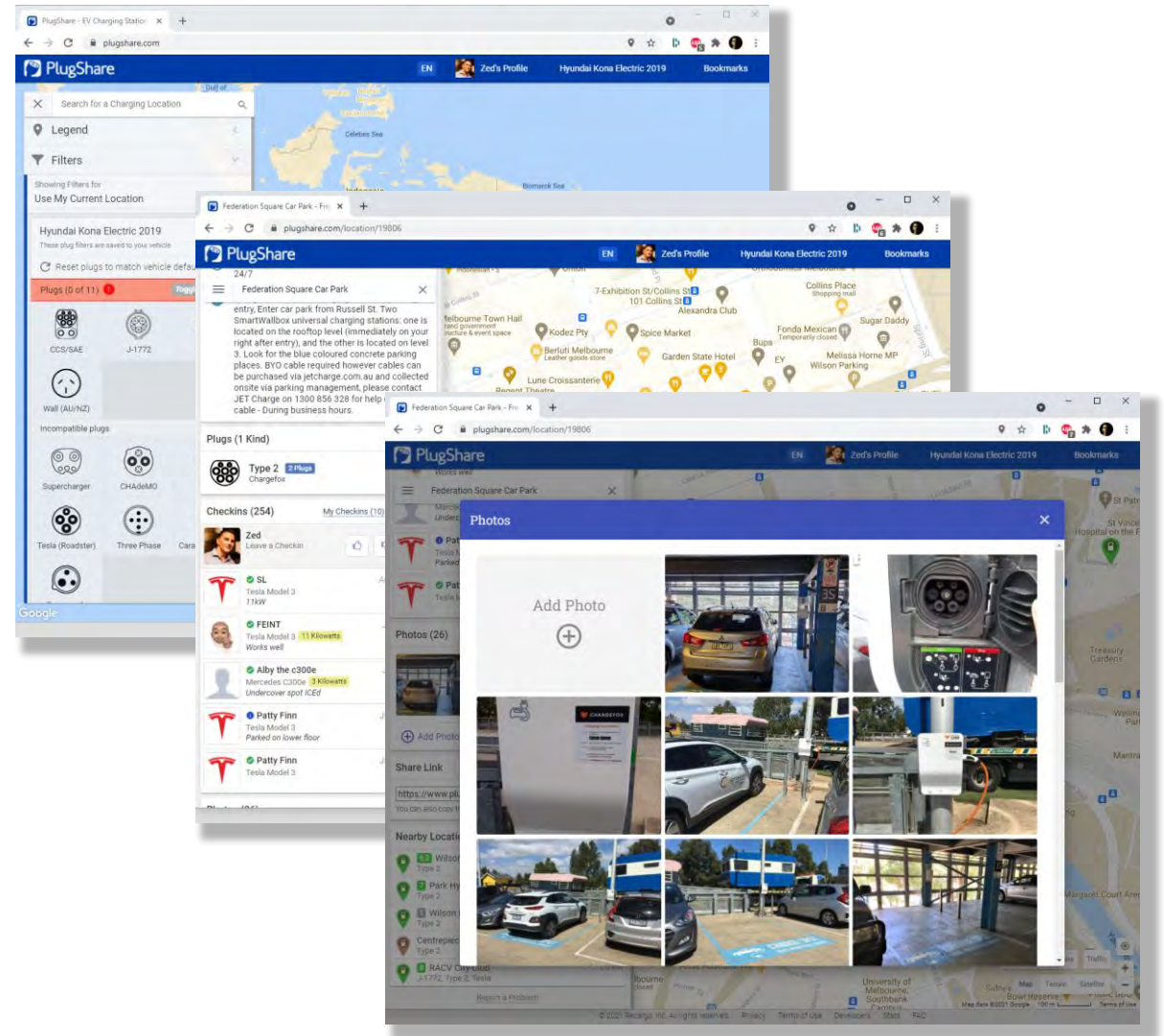
Chargefox is Australia's most comprehensive network with over 1400 plugs under management.



Finding your way (1)

PlugShare

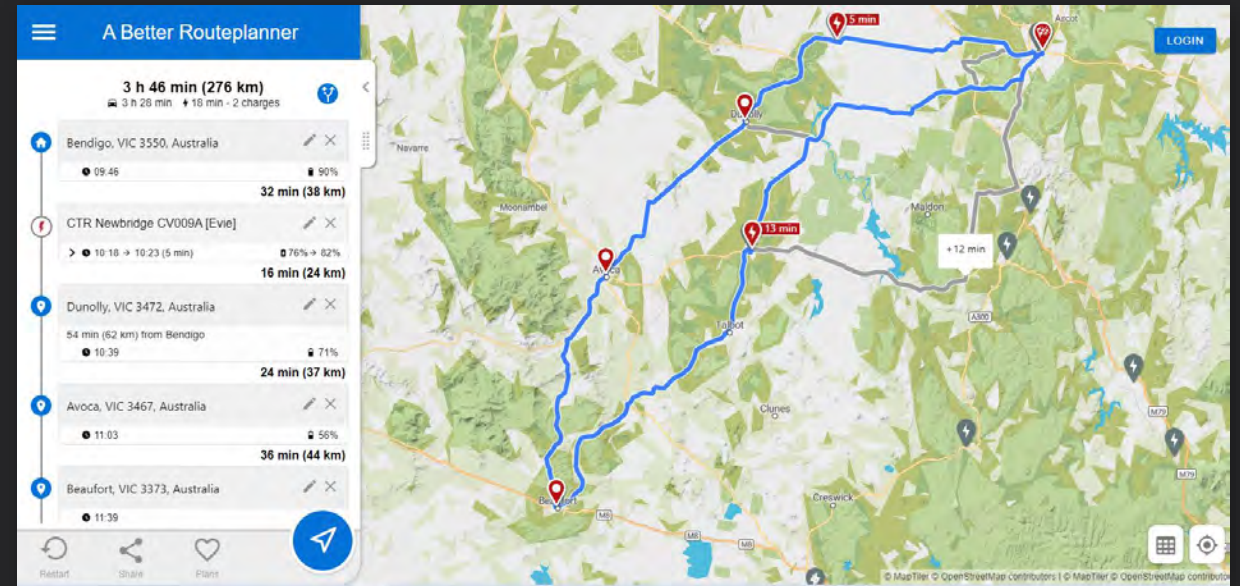
- Community driven platform – “Facebook of charging”
- Heavily used by EV enthusiasts and beginners alike
- Helps locate a wide variety of charging opportunities
- Allows drivers to communicate with each other



Finding your way (2)

A Better Route Planner

- Reliable trip planner
- Vehicle-specific advice
- Journey plan includes charging and arrival times
- Works well in conjunction with PlugShare for site-specific information



CHARGING WILL FIT AROUND PEOPLE'S INDIVIDUAL NEEDS

More and better charging opportunities are adding to existing options

Average drivers will charge mostly at home or the workplace, solutions for which are getting better and easier.

High-mileage drivers will use a lot more DC fast charging, much of which is being rolled out right now.

Example personas:

- Sales rep – charge at home except highway charging for long trips
- Apartment dweller – public charging now, apartment charging in future
- Delivery driver – depot charging now, with charging hubs in future



HOW CHARGING WORKS

Summary

- Charging fits in with how people use cars:
 - AC destination charging overnight or similar in regular parking locations, like charging your phone
 - DC fast charging en route for 10-15 min sessions when required, like traditional refuelling
- For your fleet vehicle, charging will be available at your business premise or on the road, and also at your home if this is the regular place of parking



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