

Electric Vehicles Charging

+ Dr Elliot Fishman
Institute for Sensible Transport
26th April, 2023



Getty: Corbis/Hall of Electrical History Foundation

Ruined weekends and the war on tradies



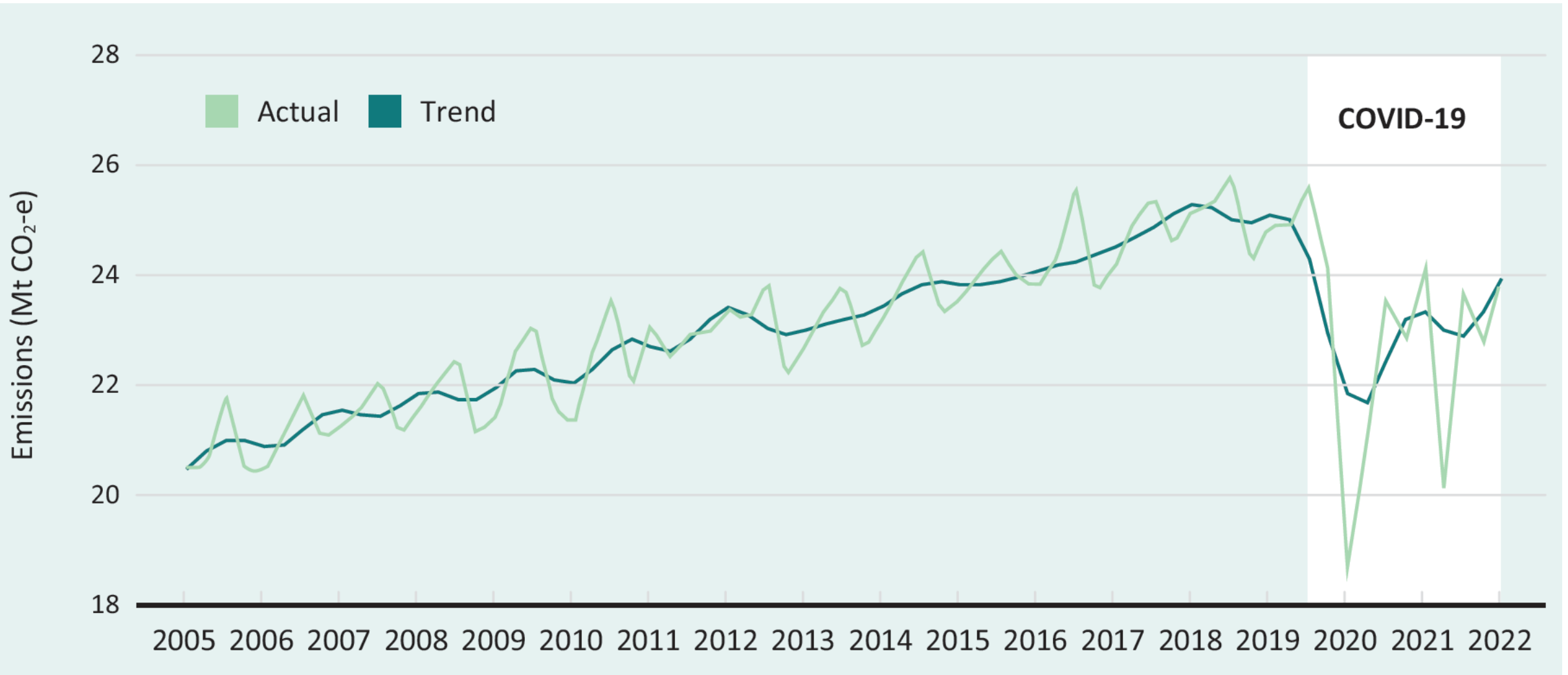


Overview

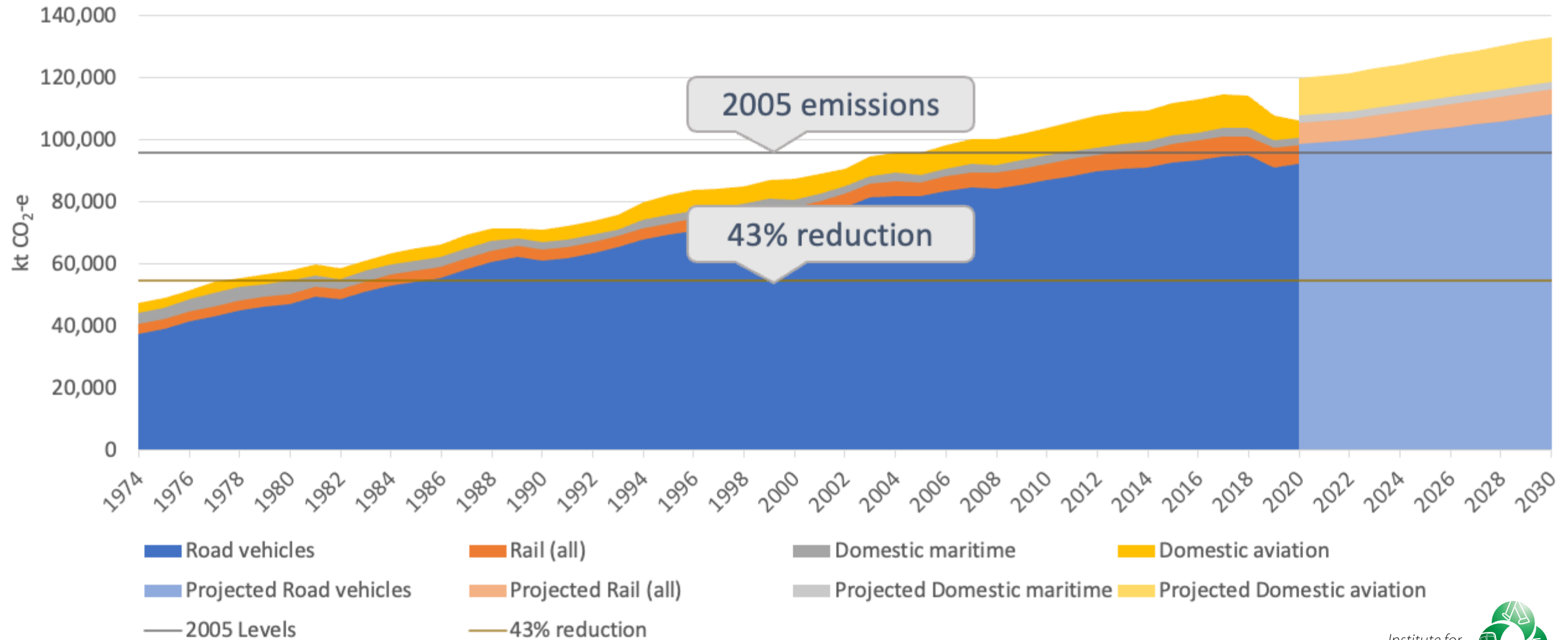
- + Transport emissions and opportunities for reduction
- + An introduction to electric vehicles
- + What influences electric vehicle adoption?
- + National Electric Vehicle Strategy
- + Charging infrastructure



Australia's rising transport emissions



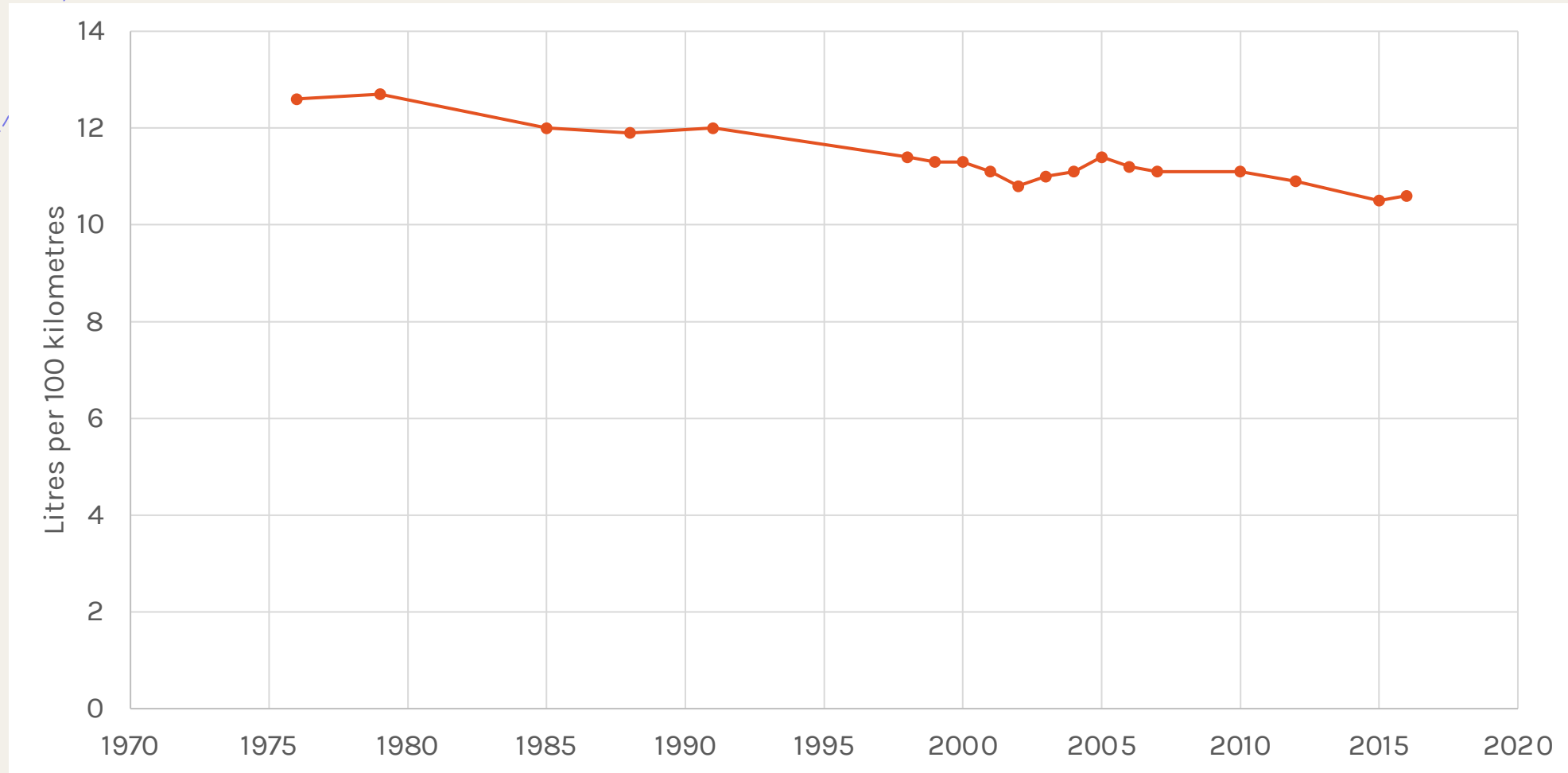
Are we on track to meet our 2030 targets?



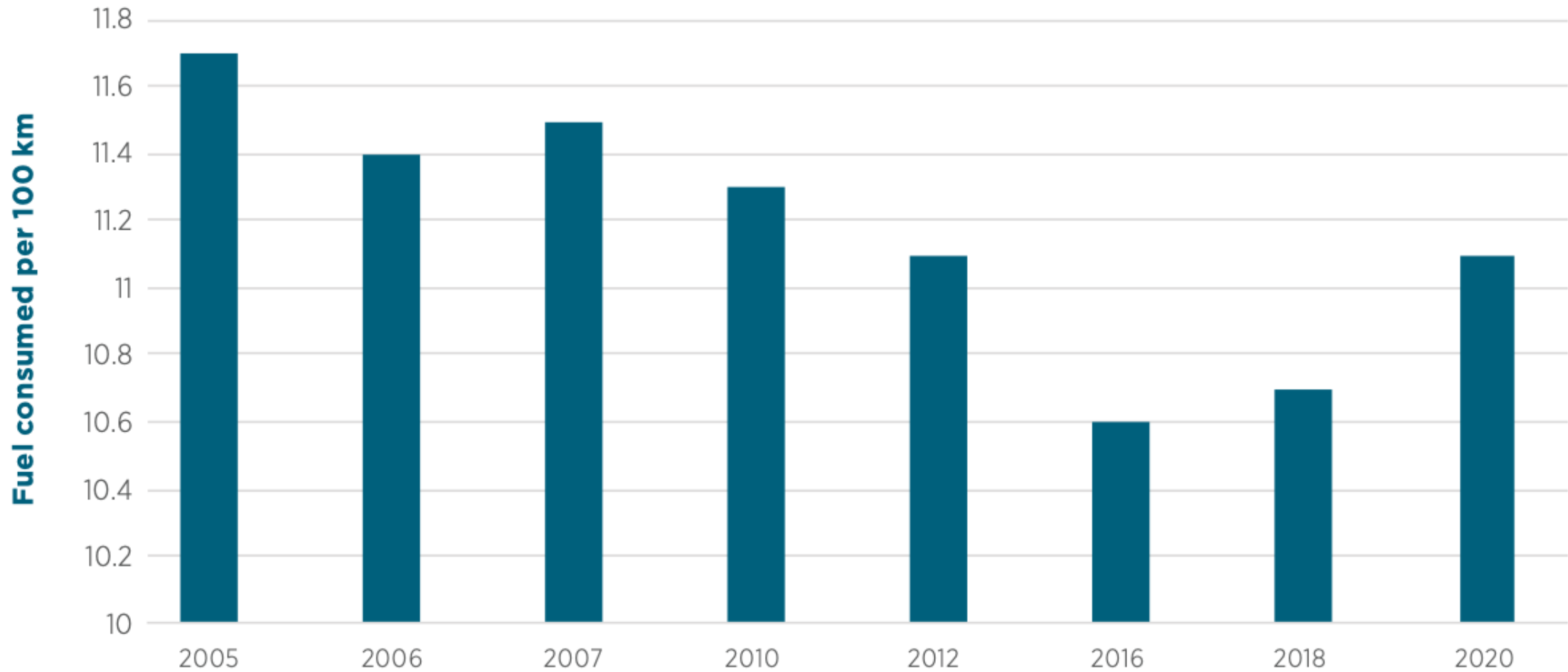
Source: Institute for Sensible Transport, using BITRE (2021) data



Car fuel consumption



Australian vehicle emissions getting worse



Pathways to lowering transport emissions

Fuel efficiency
Through conversion to more efficient vehicles (e.g. pure EV)

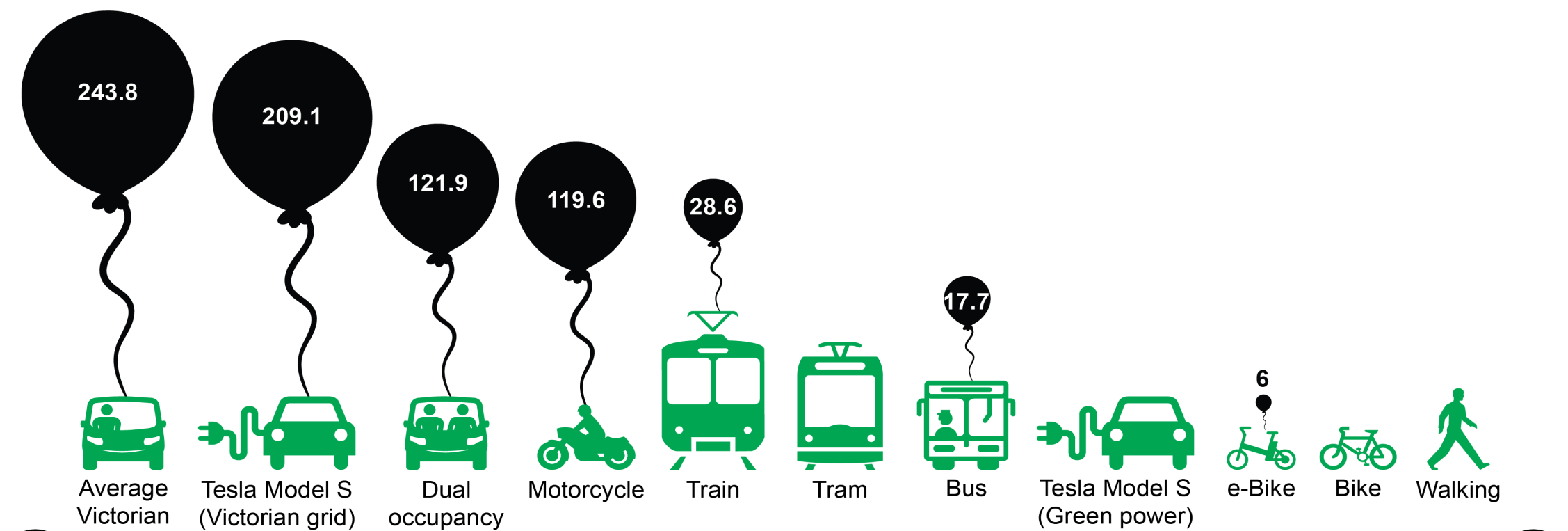
Mode change
Shifts from car to more efficient modes (e.g. e-bike)

Decrease VKT (without mode change)
People making shorter car trips

Trips avoided
Choosing to travel less through trip chaining, telecommuting etc.

Doing more with less





Dirty **Clean**



















= Grams of CO2 per person kilometre travelled = Space in m² required per occupant

Note: These figures are specific to Melbourne, Australia. Trams are 100% off-set by renewable energy.





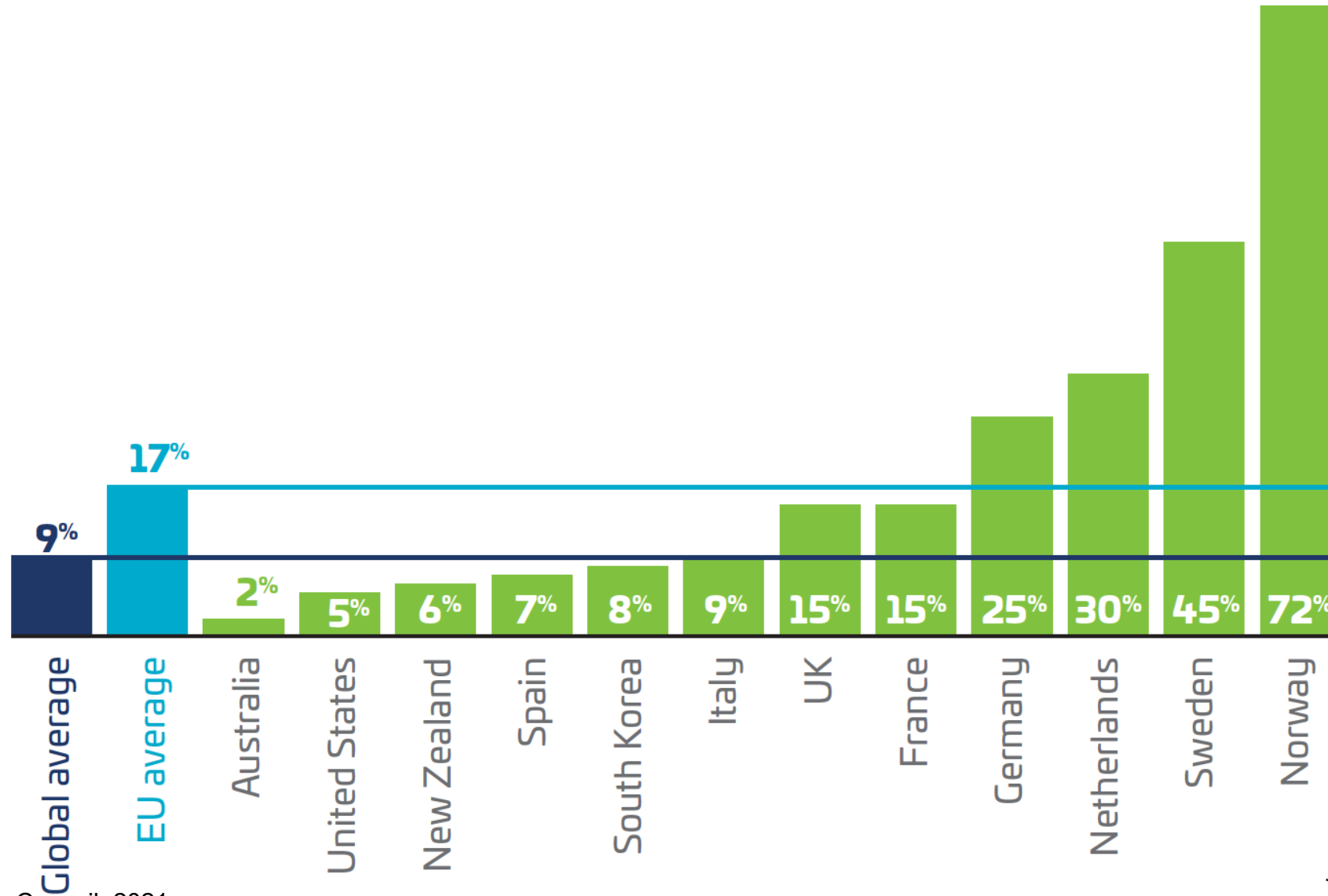
Types of EVs

		Energy Sources	Consumption	Emissions
Conventional				
Hybrid				
Plug-In Hybrid				
All-Electric				

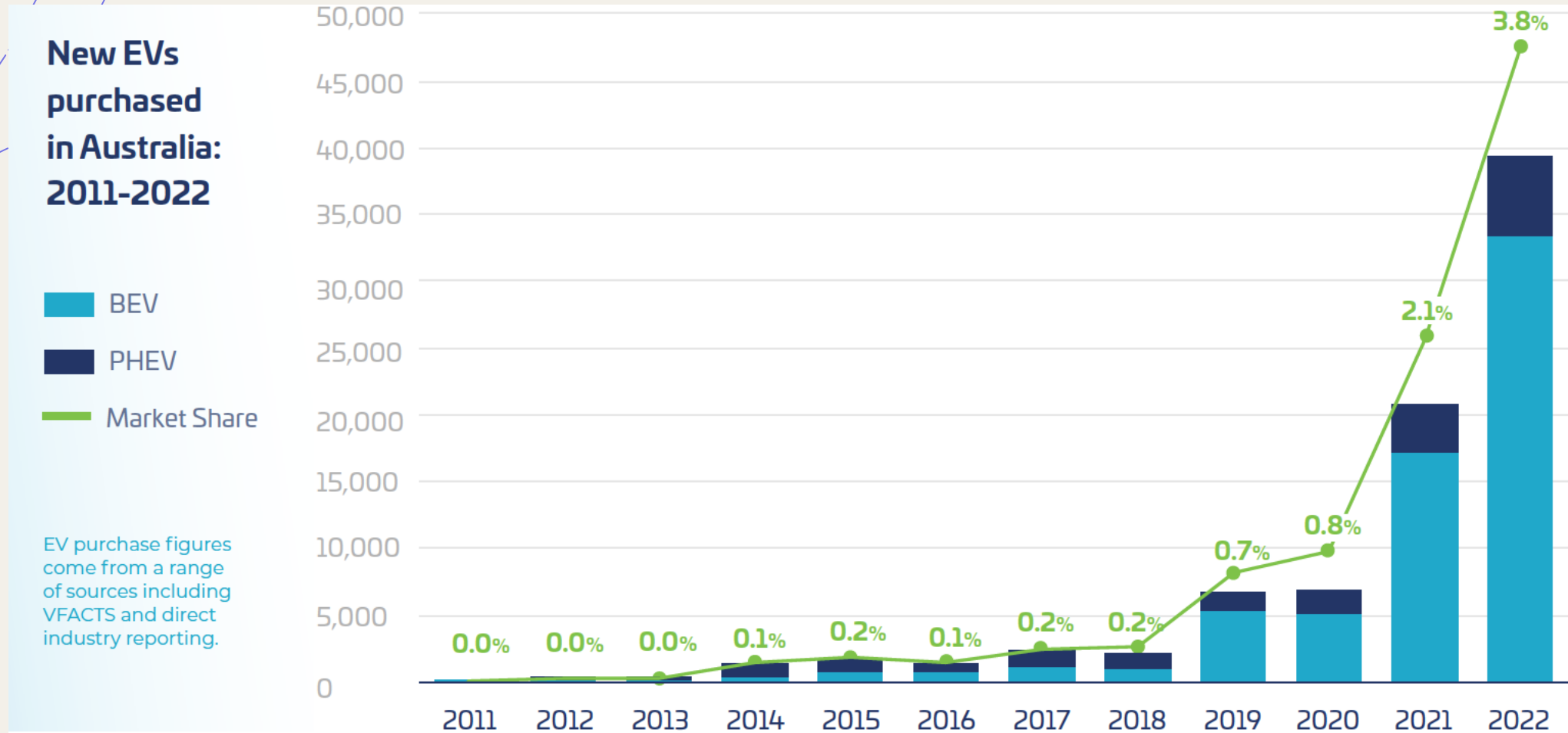
How much do they cost and how far can they go?



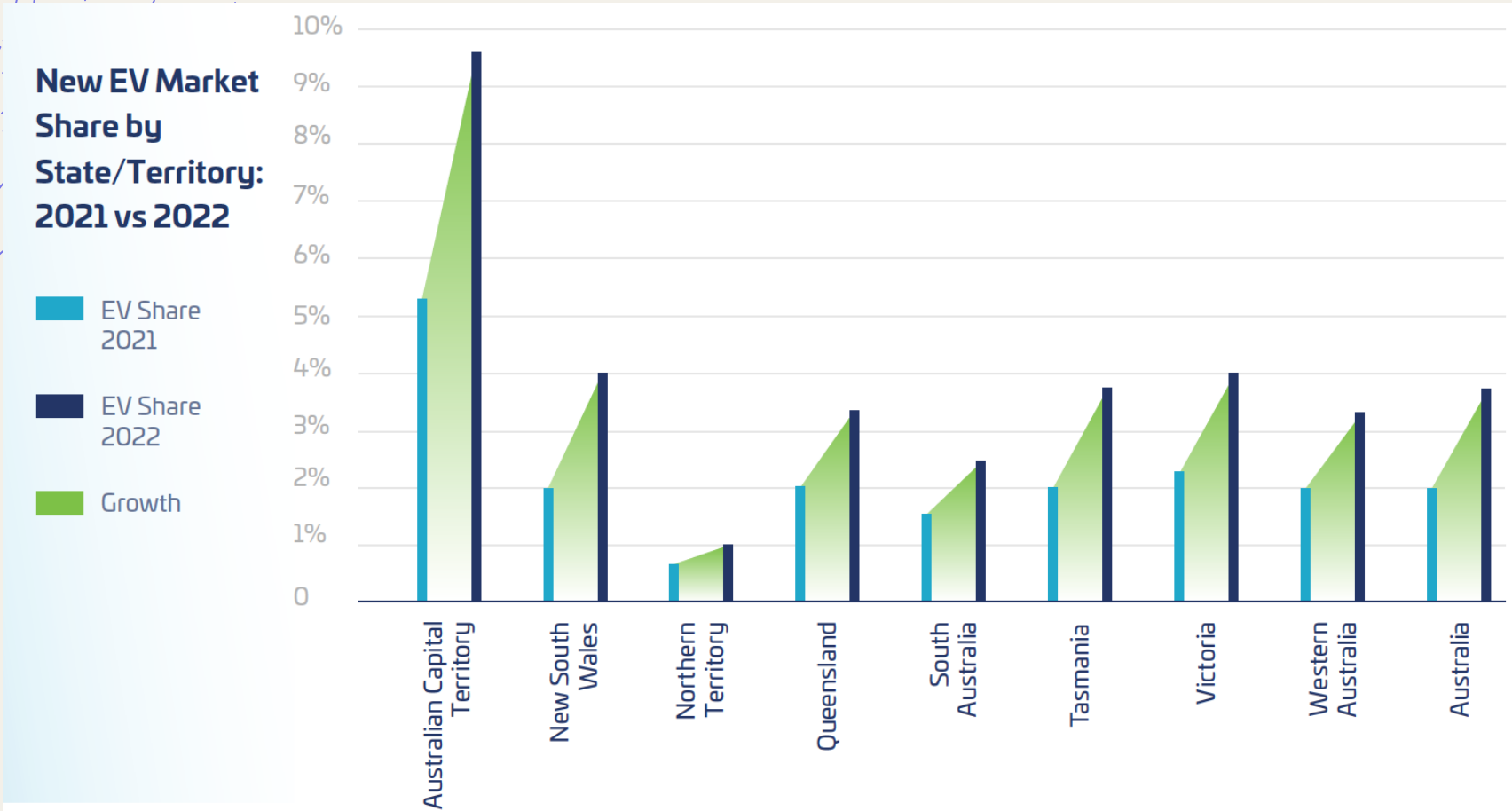
EVs as a percentage of new cars sold



EV sales are rising fast in Australia



EV sales within Australia



The Victorian EV road use charge had no obvious impact on sales

Electric vehicles - compared to a few years ago

- +Cheaper
- +Longer range (km)
- +Wider variety of models
- +Increased charging opportunities
- +More government agencies have strong targets for zero emission fleets

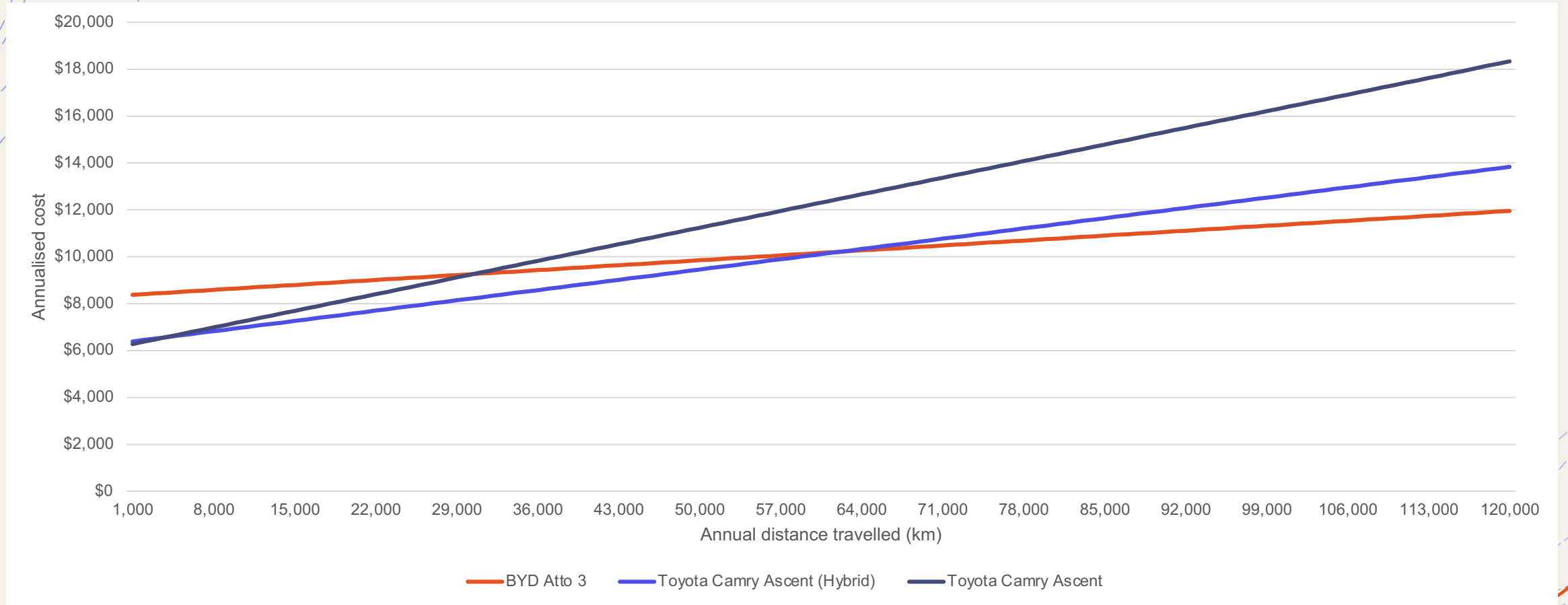


Benefits of electric vehicles

- + Improve local air quality
- + Reduce tail-pipe GHG emissions
- + Reduce noise pollution
- + Reduce vehicle running costs



Cost comparison for medium passenger vehicles



Key trends

Cheaper batteries, longer life, and greater energy density

Faster charging

Market differentiation - shorter range (100-200km) + longer range (600km+)

Cheaper domestic chargers

Smarter chargers + solar interactive

Bi-directional charging







Solar roofs

Key factors influencing EV adoption



Vision

Increase the uptake of EVs to reduce our emissions and improve the wellbeing of Australians

Objectives

NEW INITIATIVES

EXISTING INITIATIVES

SUPPLY

Increase supply of affordable and accessible EVs

- ▶ Developing Australia's first Fuel Efficiency Standard for new light vehicles
- ▶ Preparing for a recycling, reuse and stewardship initiative for EV and other large format batteries
- ▶ State and territory EV fleet targets, incentives, and commitments – like the Queensland Government's target for 50% of new passenger vehicle sales to be zero emissions by 2030 and 100% by 2036*
- ▶ Net Zero Australian Public Service by 2030, including 75% low emissions vehicles for Commonwealth fleet new passenger vehicle purchases and leases by 2025
- ▶ The Australian Made Battery Plan, National Reconstruction Fund, and Critical Minerals Strategy

SYSTEMS AND INFRASTRUCTURE

Establish the resources, systems and infrastructure to enable rapid EV uptake

- ▶ Developing a national mapping tool to support optimal investment in – and deployment of – EV charging infrastructure
- ▶ Tools and guidance to enable EV uptake for residents of existing multi-residential buildings
- ▶ Funding to support world-leading EV guidance, demonstrations, and training for emergency service workers
- ▶ National network of 117 EV chargers on major highways at an average interval of 150 km, delivered in partnership with NRMA
- ▶ State and territory EV infrastructure and charging investments – like the WA Government's \$22.9 million investment to install almost 100 charging stations at 49 locations*
- ▶ \$500 million Driving the Nation Fund
- ▶ New Energy Apprenticeships and New Energy Skills Program
- ▶ Commonwealth, state and territory collaboration to ready the electricity grid for EV uptake

DEMAND

Encourage increase in EV demand

- ▶ Electric Car Discount amendments to fringe benefit tax and import duty
- ▶ State and territory EV purchasing incentives and subsidies – like the ACT Government's zero interest loans for up to \$15,000*
- ▶ \$20.5 million CEFC green car loans

Outcomes



Expand EV availability and choice



Reduce road transport emissions



Make it easy to charge an EV across Australia



Increase local manufacturing and recycling



Make EVs more affordable



Reduce the cost to Australians of running their vehicles

Commonwealth, state and territory collaboration on

National standards

Remote and regional EV charging infrastructure

EV affordability

Data sharing

Fleet procurement

Education and awareness

Underpinned by

Ongoing collaboration with states and territories

Clear indicators to measure progress against outcomes

Ongoing industry, union and community engagement

Annual updates, with a comprehensive review in 2026

Private and public sector research and investment

International learnings and partnerships


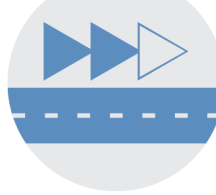


The one big thing?

Fuel Efficiency Standards for new light vehicles

Charging infrastructure



Charging infrastructure types

	 Power	 Range added per hour	 Charging Time	 Typical Application
Level 1 - single phase (domestic)	2.4 - 3.7kW	10 - 20km range / hour	5 - 6 hours	Home
Level 2 - slow single phase (domestic or public)	7kW	30 - 45km range / hour	2 - 5 hours	Home, work, shopping centres, car parks
Level 2 - fast three phase (public)	11 - 22kW	50 - 150km range / hour	30mins - 2 hours	Urban roadside
Level 3 - fast charge (public)	50kW	250 - 300km range / hour	20 - 60 mins	Activity centres, and near highways, motorways and key routes
Level 4 - super-fast charge (public)	120kW	400 - 500km range / hour	20 - 40 mins	Highways, motorways and key routes
Ultra fast charge (public)	350kW	1,000+ km range / hour	10 - 15 mins	Major highways and motorways

Planning for Public Access Charging



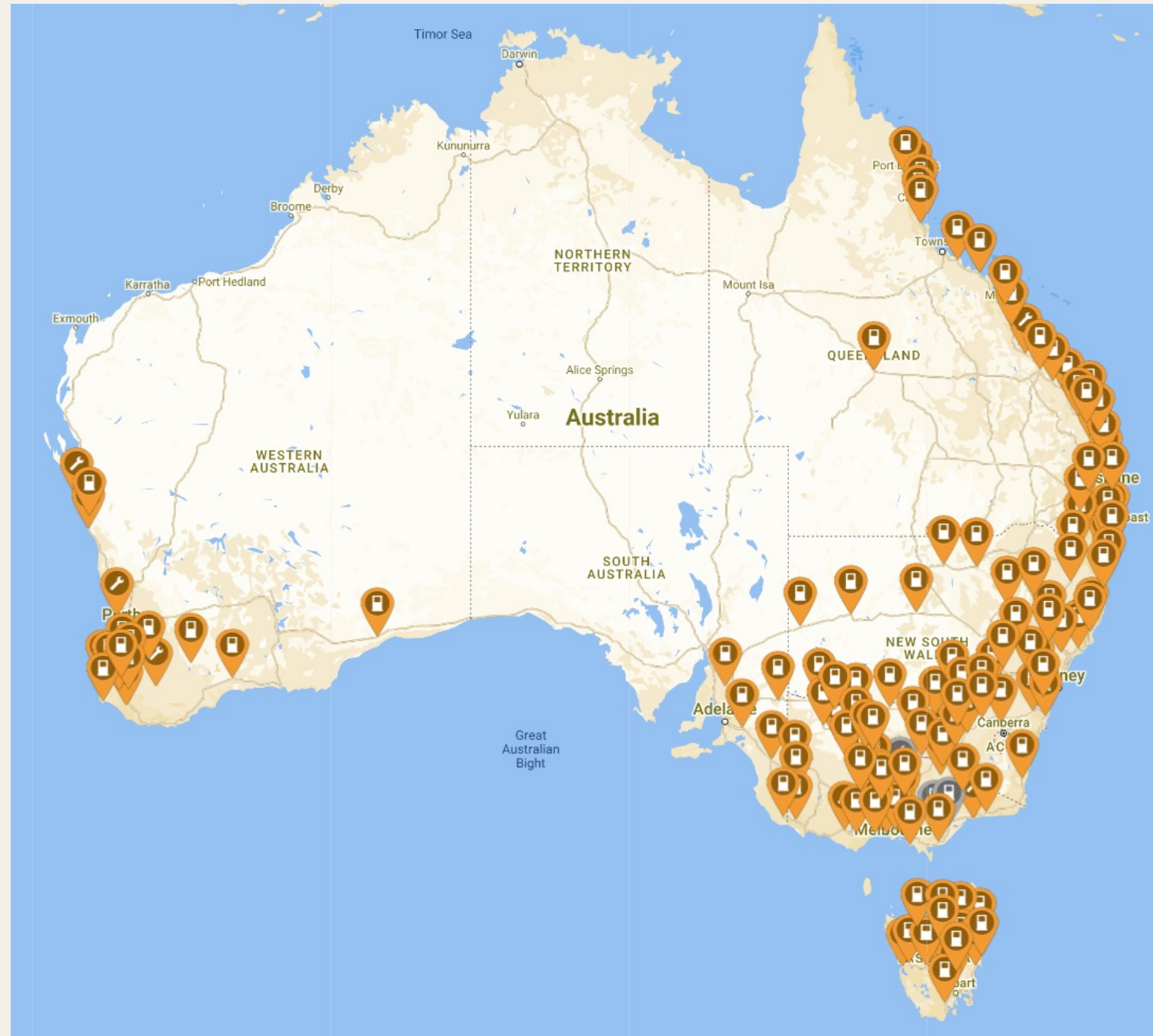
The number of EV charging stations in Australia doubled in the last three years



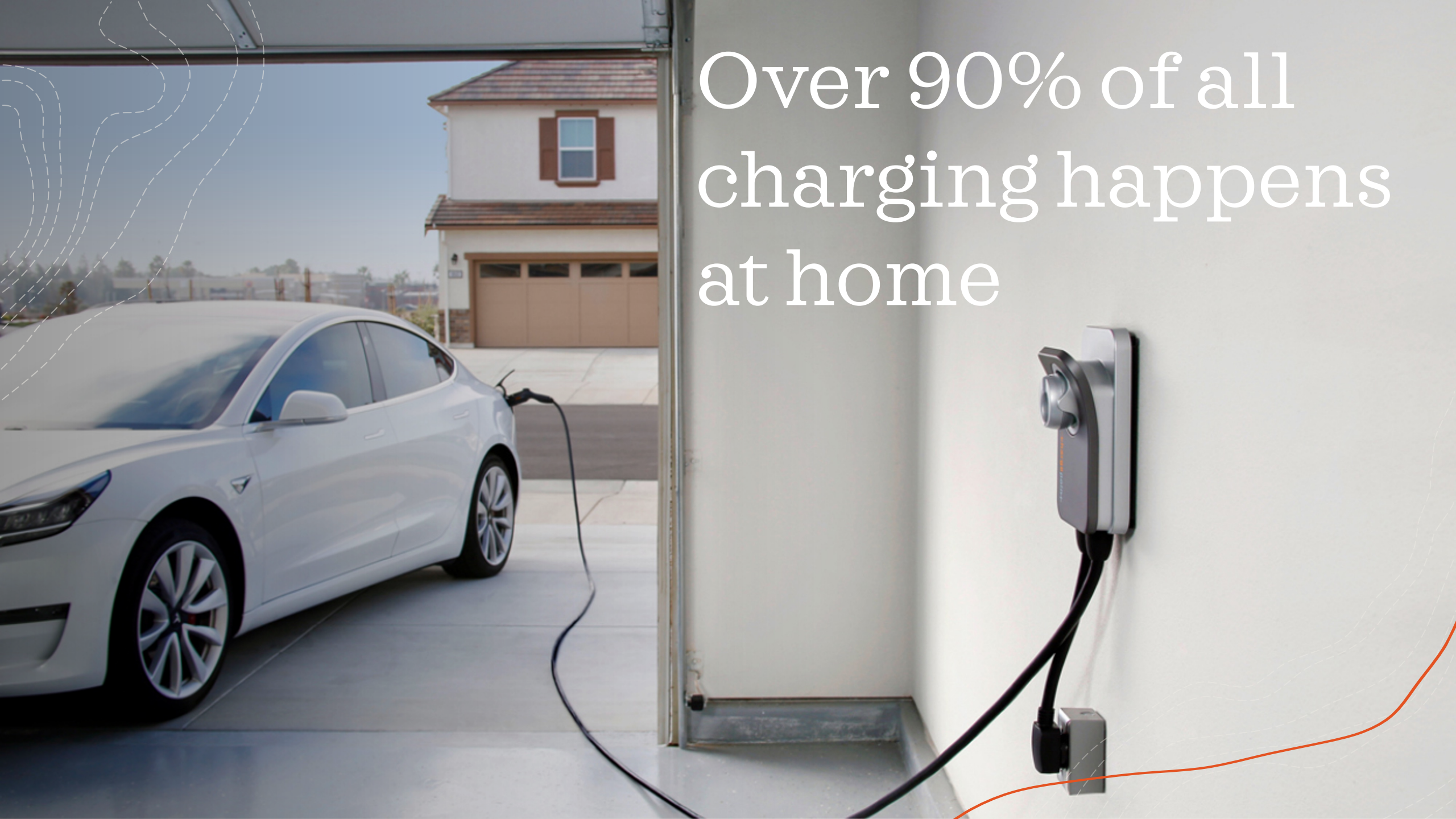


Source: Plugshare.com

Fast charging

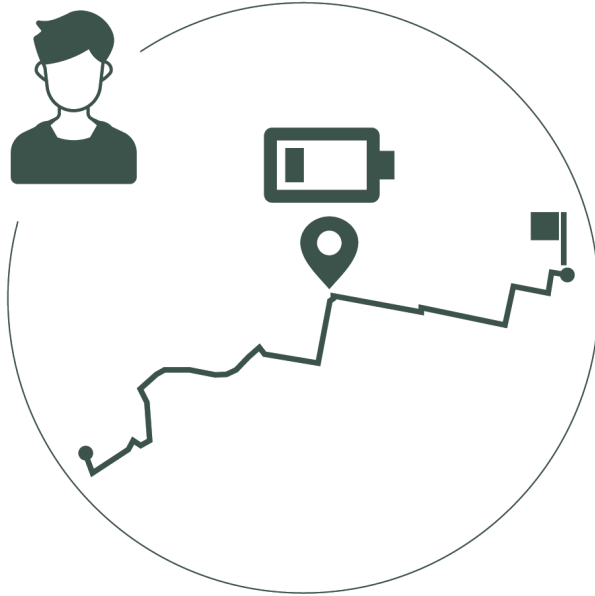


Over 90% of all
charging happens
at home



1 Passing Through Motorist

Daniel, needs a recharge to get to his destination



150kW - 350kW
DC charger



2 Opportunistic

Sam, goes to the shops and tops up while parked



25kW - 50kW
DC charger

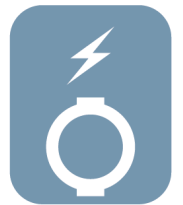


3 Local Resident

Cassie, does not have a garage for charging



7kW
charger



EV CHARGING MAP



SEMI-DETACHED HOUSING ⚡

SUPERMARKET ⚡

HOTEL ⚡

HOSPITAL ⚡

BUSINESS PARK ⚡⚡

AIRPORT ⚡⚡⚡

APARTMENTS ⚡

SCHOOL ⚡

RAILWAY STATION ⚡

ACTIVITY CENTRE ⚡

INTERMODAL FREIGHT HUB ⚡⚡

BUS TERMINAL ⚡⚡

INDUSTRIAL HUB ⚡⚡

PORT ⚡⚡

SUBURBAN HOUSING ⚡

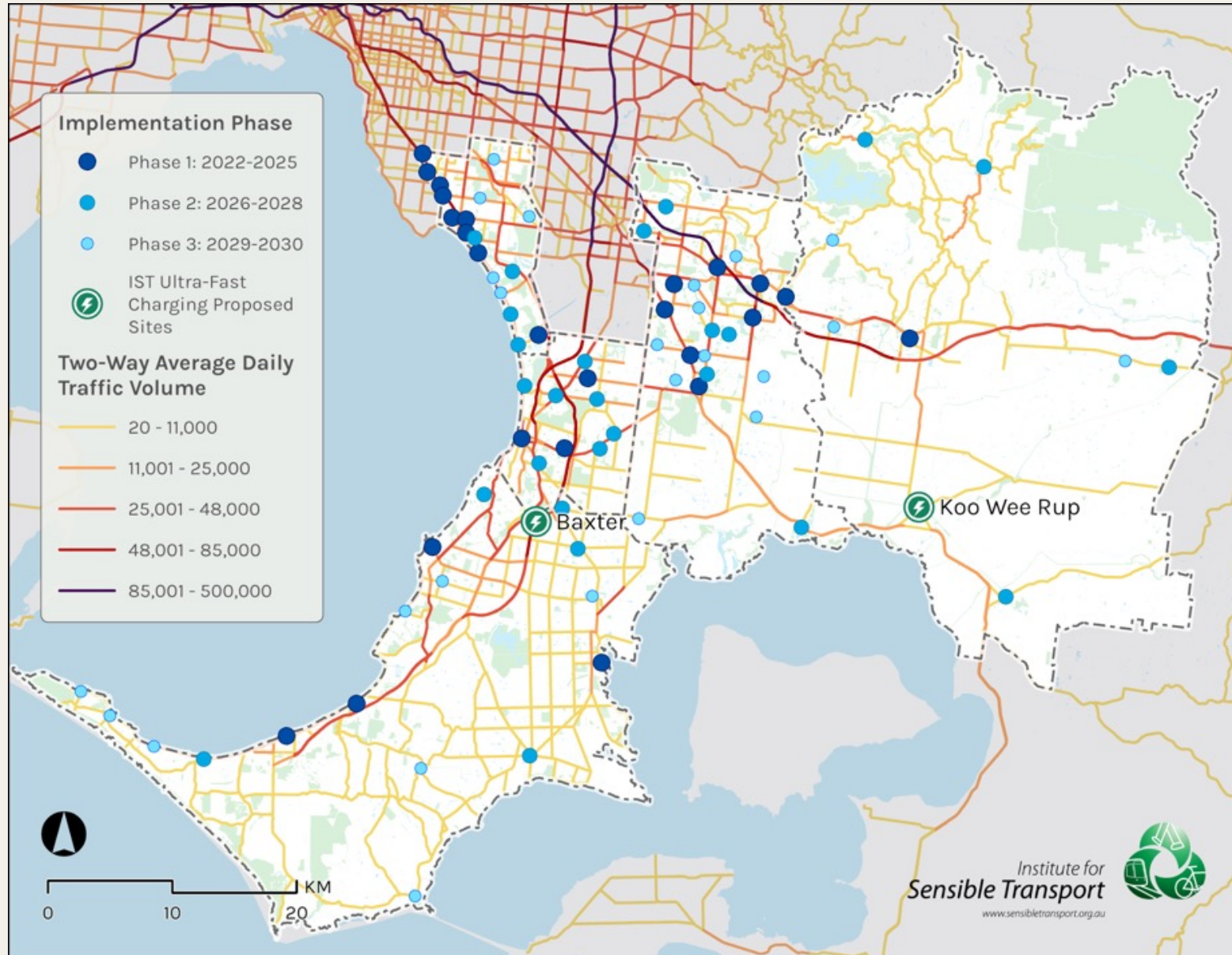
SERVICE STATION ⚡

⚡ AC, Slow Charger (7kW)

⚡ DC, Fast Charger (25 - 50kW)

⚡ DC, Ultra Fast Charger (120 - 350kW)

SECCCA EV Charging Roadmap



Electric Vehicle Charging Roadmap

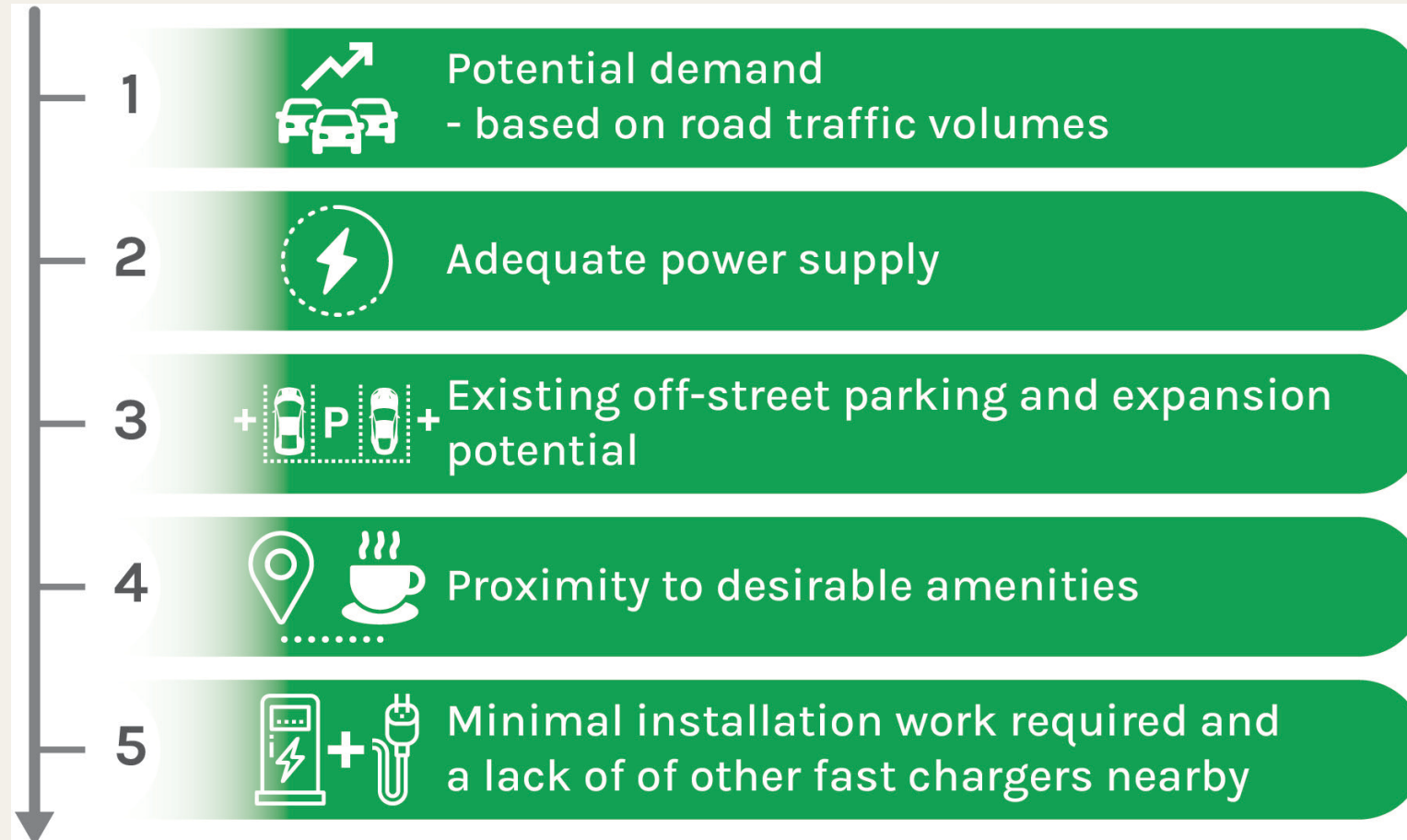
Prepared for SECCCA

Final Report, May 2022

Institute for
Sensible Transport



Prioritisation Framework > Passing through motorist



Prioritisation Framework > Opportunistic



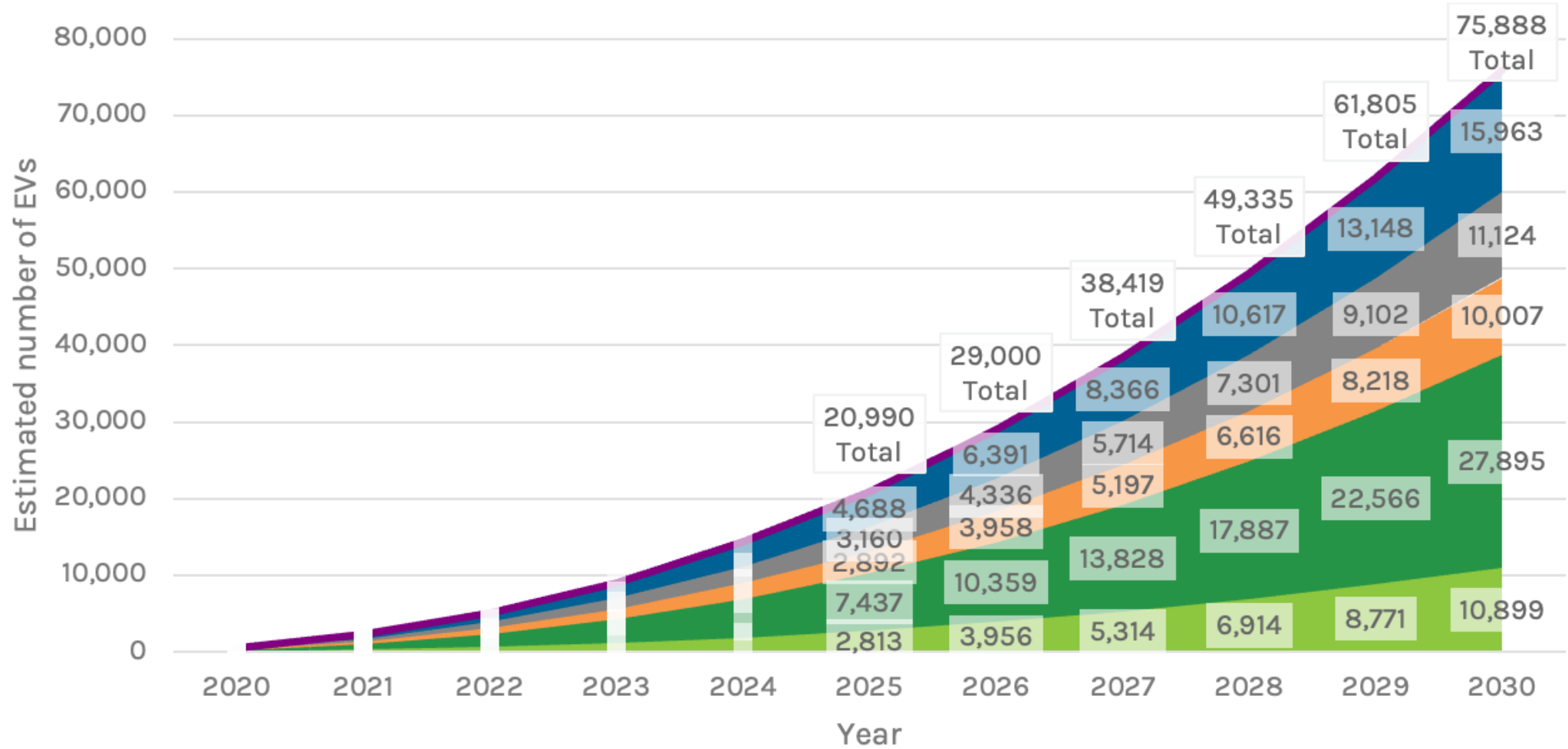
Best practice example



How to forecast EV ownership at the local government level

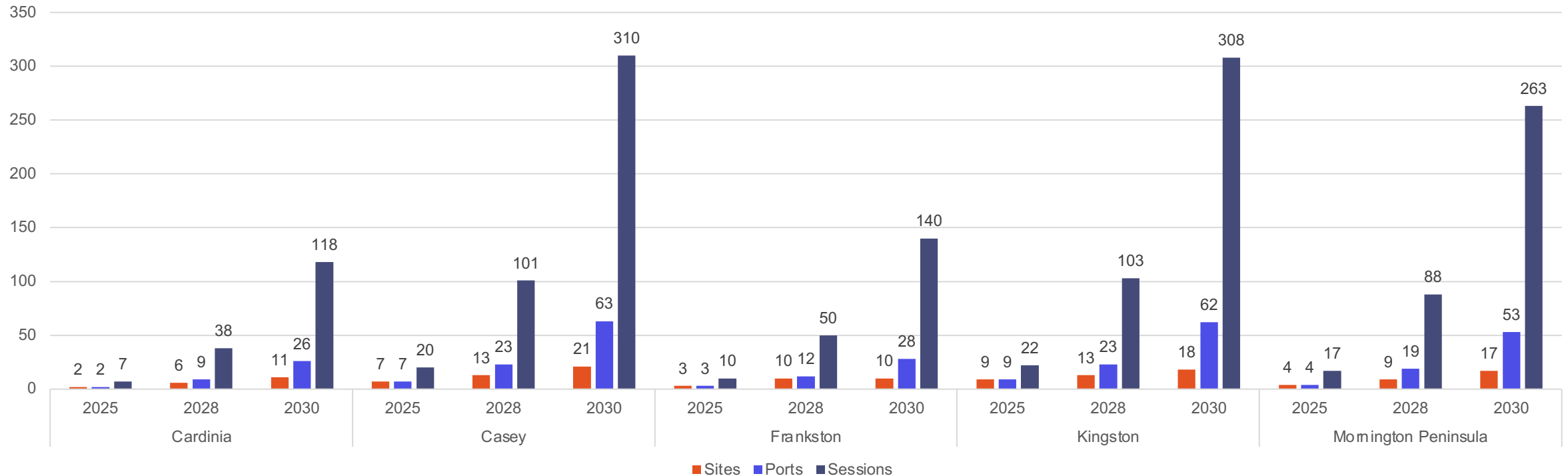


Forecasting EV ownership



■ Cardinia
 ■ Casey
 ■ Frankston
 ■ Kingston
 ■ Mornington Peninsula
 ■ Total

How many charging stations, ports and estimated sessions



Implementation Phase

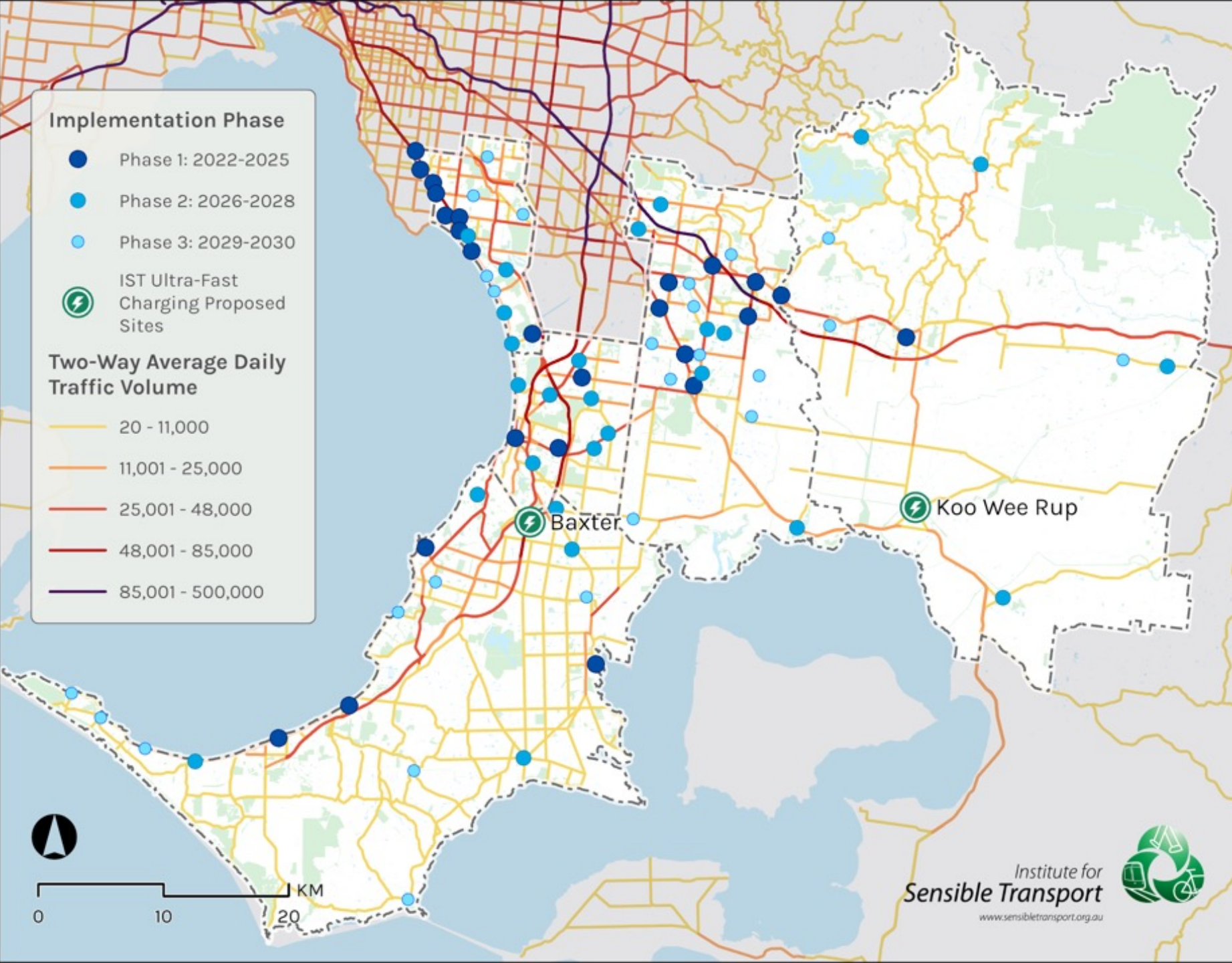
- Phase 1: 2022-2025
- Phase 2: 2026-2028
- Phase 3: 2029-2030

IST Ultra-Fast Charging Proposed Sites

- ⚡

Two-Way Average Daily Traffic Volume

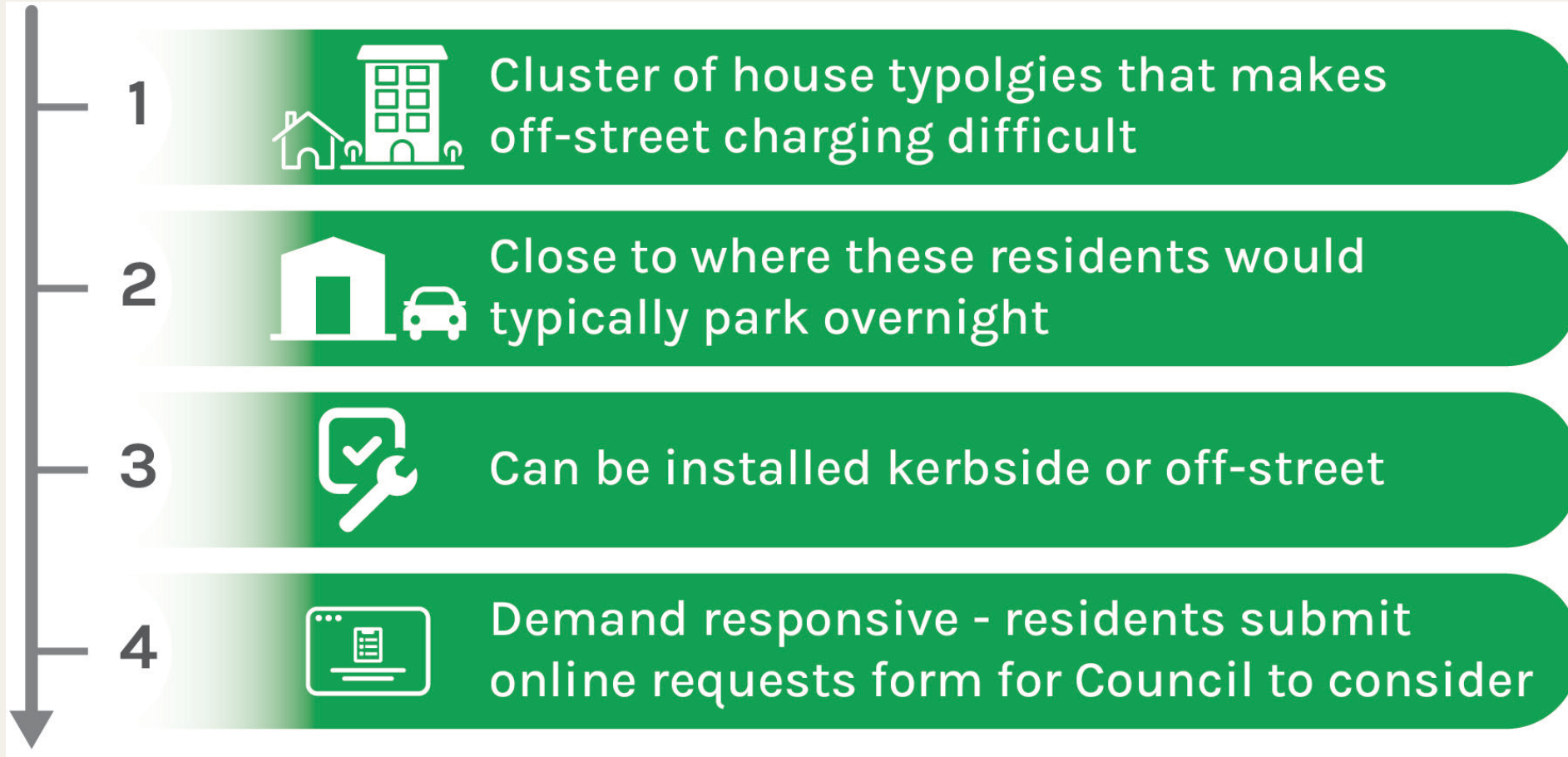
- 20 - 11,000
- 11,001 - 25,000
- 25,001 - 48,000
- 48,001 - 85,000
- 85,001 - 500,000

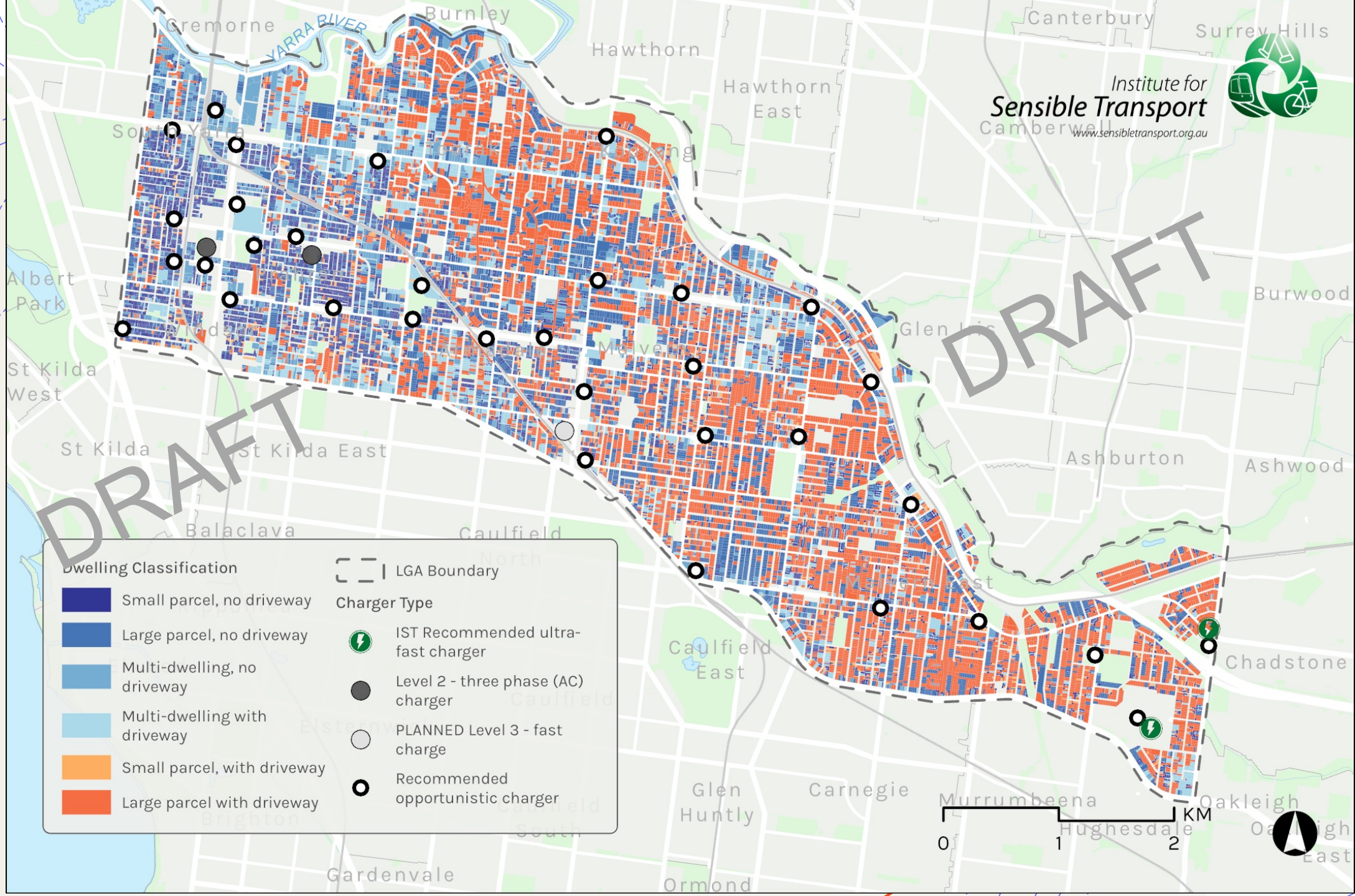


What about households without off street parking?

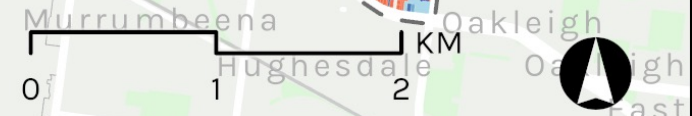


Prioritisation Framework > Residential





Dwelling Classification		Charger Type	
	Small parcel, no driveway		IST Recommended ultra-fast charger
	Large parcel, no driveway		Level 2 - three phase (AC) charger
	Multi-dwelling, no driveway		PLANNED Level 3 - fast charge
	Multi-dwelling with driveway		Recommended opportunistic charger
	Small parcel, with driveway		
	Large parcel with driveway		
	LGA Boundary		



Solutions for households without EV charging options on site



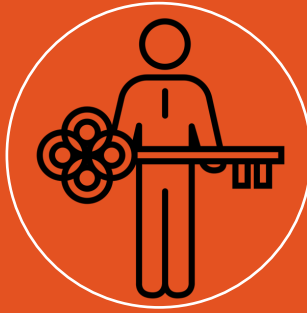
Approximate costs

Charger type	Approx. cost
Single port AC 32A 3-Phase 22kW charger	\$5,500
Dual port AC 32A 3-Phase 22kW charger	\$7,000
Dual port DC 25kW charger (one car at a time)	\$30,000
Dual port DC 50kW charger	\$50,000 - 80,000

What's the role of Council in EV charging?



Funding



Ownership



Operation



How much should Councils charge?





What's the most popular
type of electric vehicle?



Dutch Transport Innovation Study Tour

25 June to 30 June, 2023

One spot remaining



Webinar on Transport Emissions in Australia

27th April (tomorrow)

11am AEST



Liam Davies
Associate Director



Scan to join

No war on tradies and no ruined weekend

Dr Elliot Fishman

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