Electric Vehicles Charging

Dr Elliot Fishman

Institute for Sensible Transport

26th April, 2023

Institute for Sensible Transport

www.sensibletransport.org.au

Getty: Corbis/Hall of Electrical History Foundation

Ruined weekends and the war on tradies

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Australian Government
National Electric Vehicle

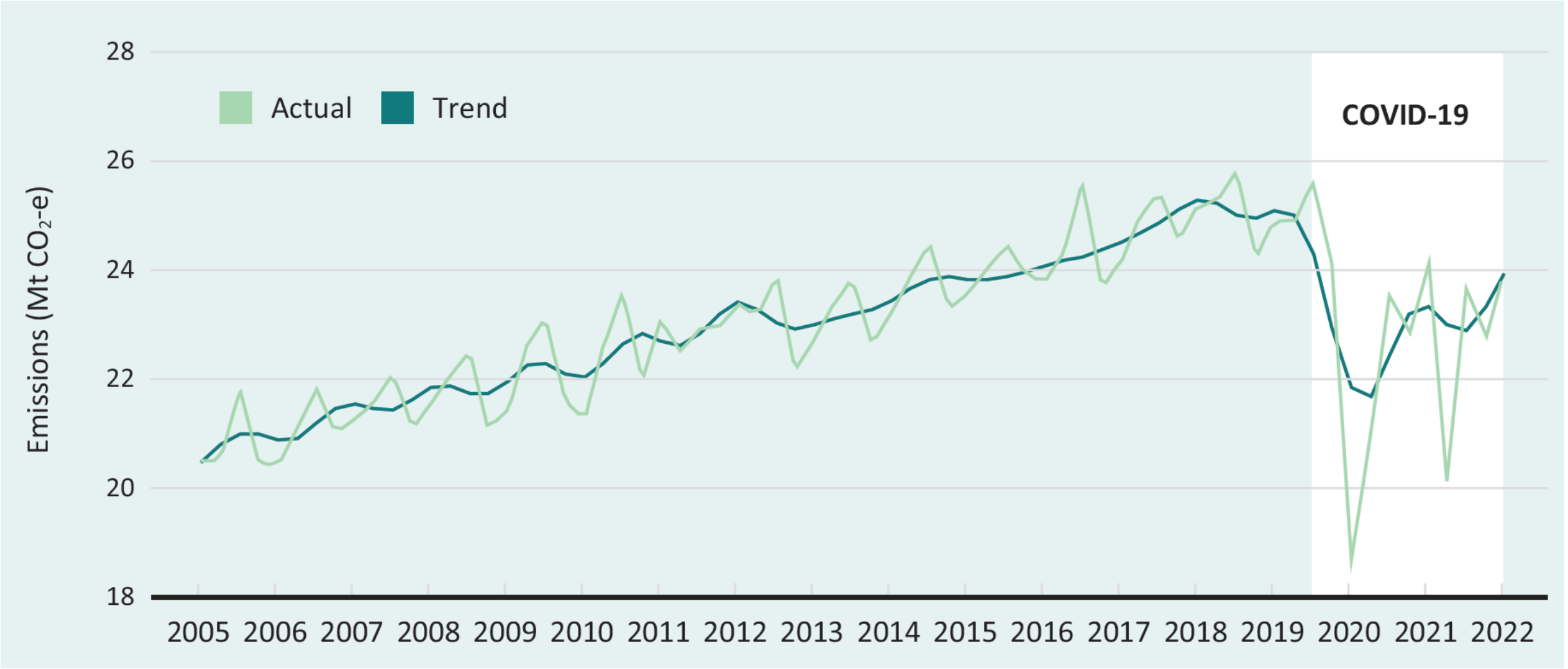

FINANCE ME

Images: AAP

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



Source: DCCEEW 2022, cited in National Electric Vehicle Strategy, 2023

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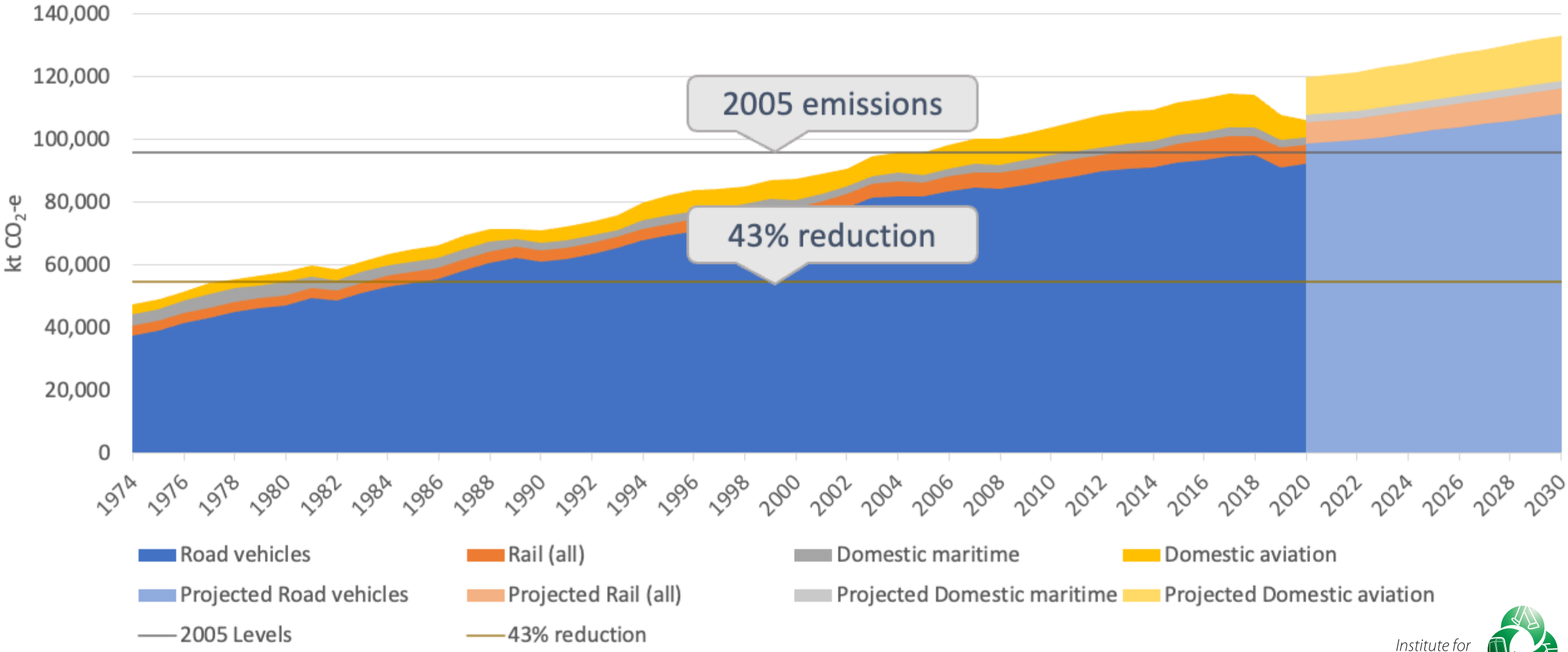
Are we on track to meet our 2030 targets?



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

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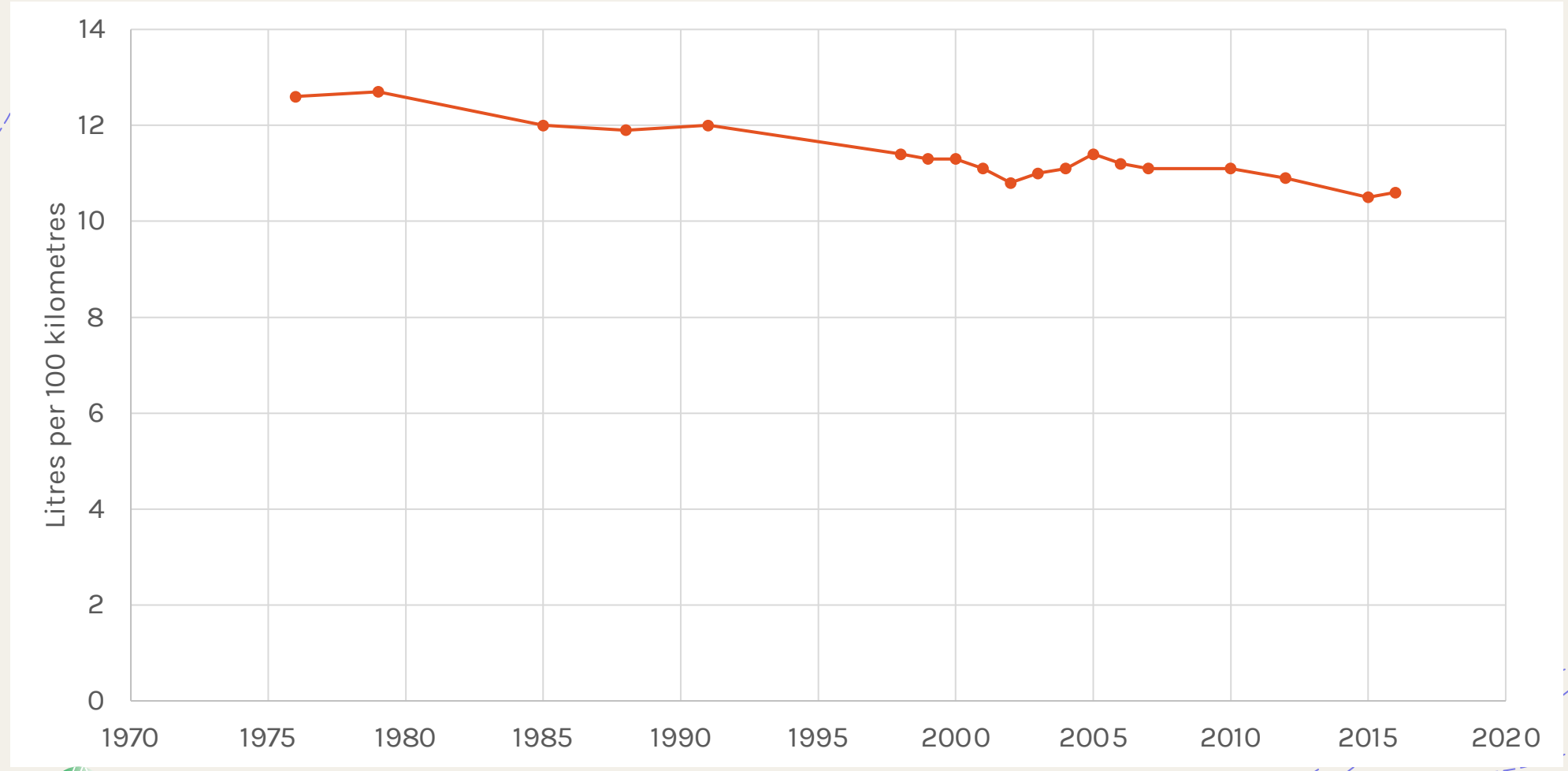
Car fuel consumption



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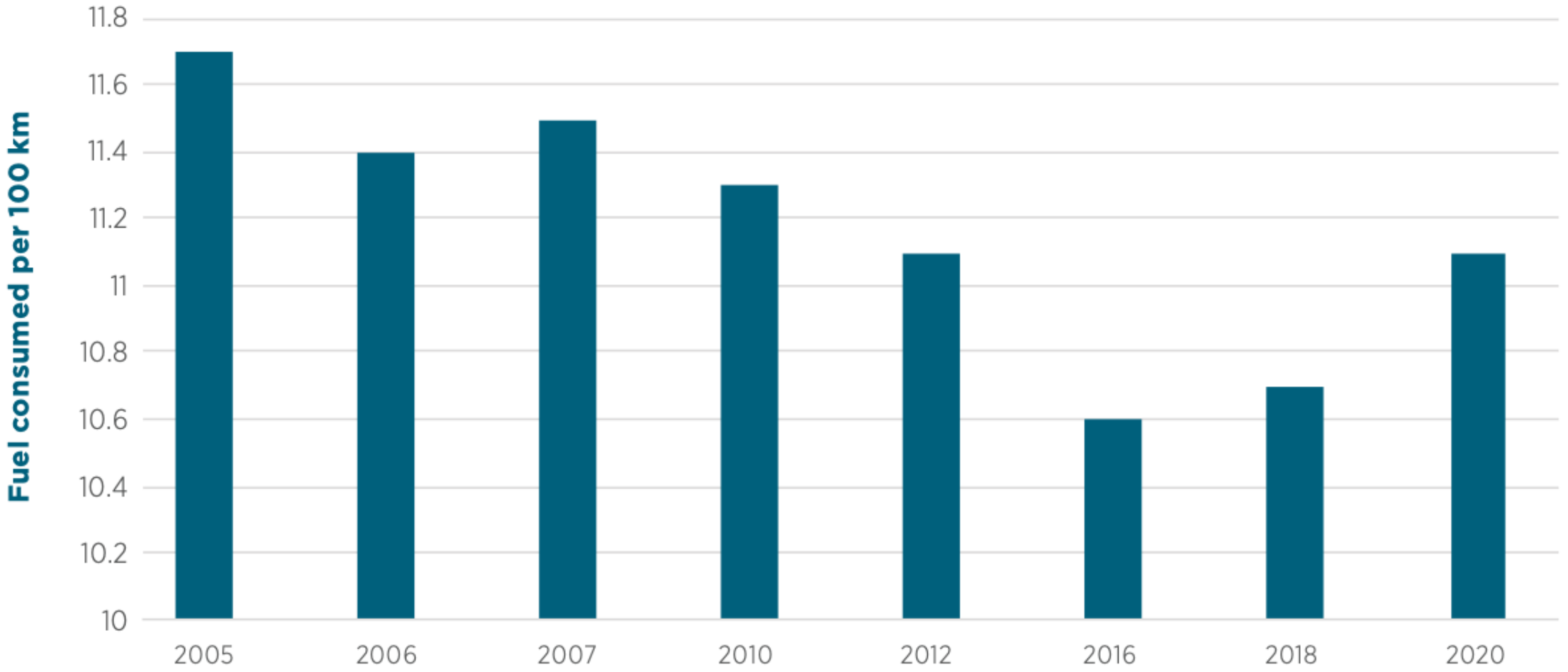
Source: ABS

Australian vehicle emissions getting worse



Source: National Greenhouse Gas Inventory, 2020

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.

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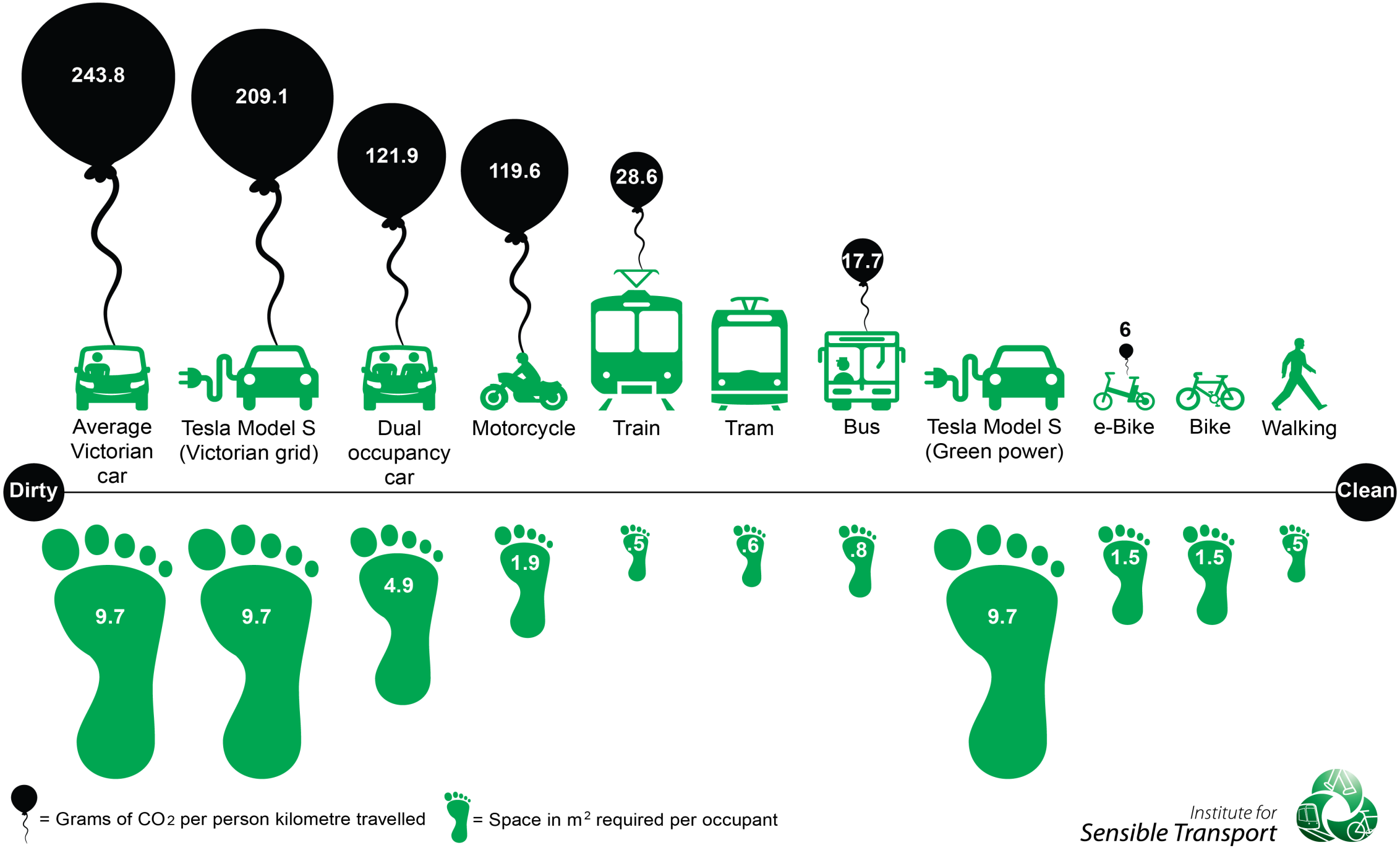
Doing more with less



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

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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?

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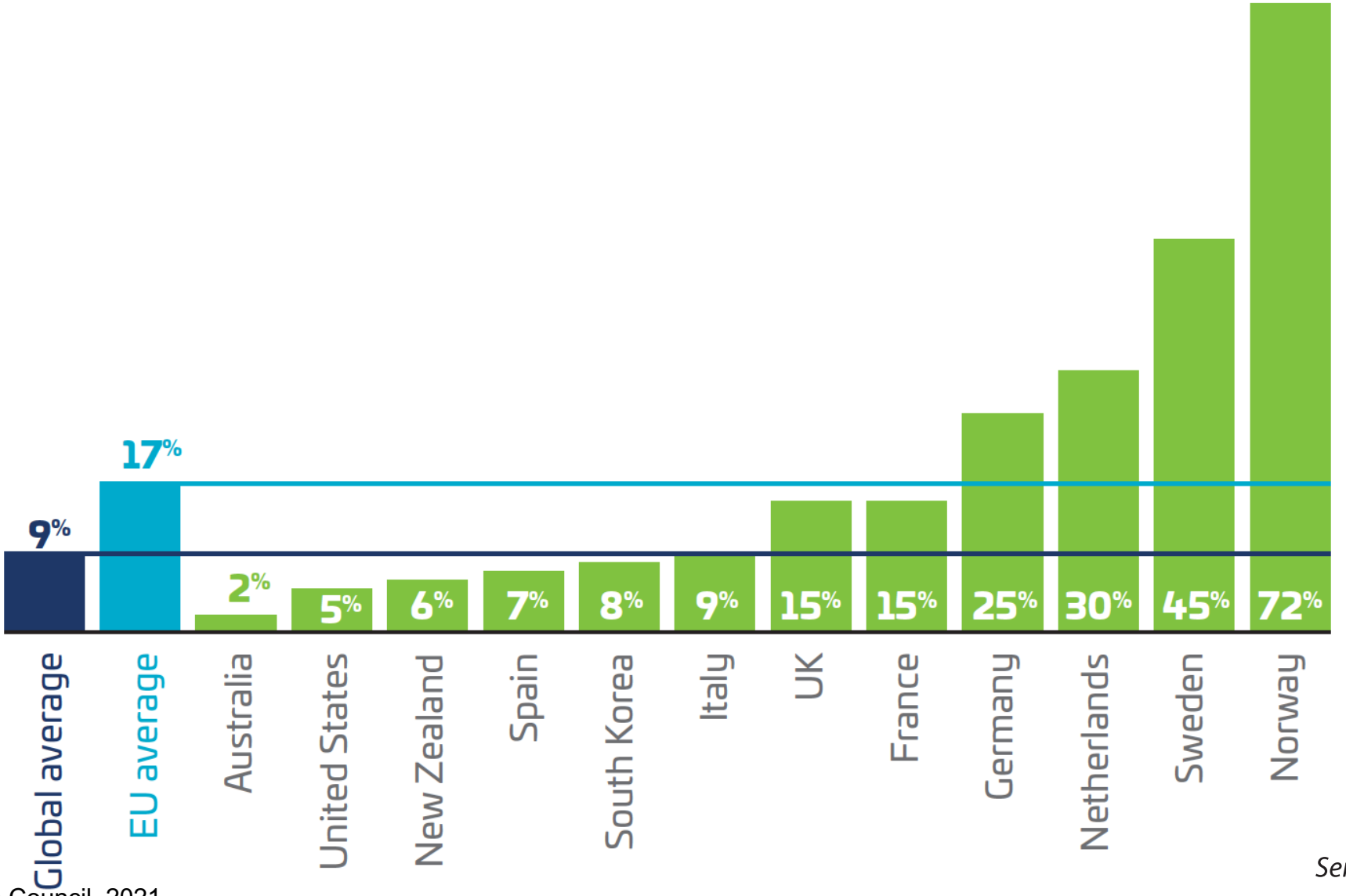
EVs as a percentage of new cars sold



Source: Electric Vehicle Council, 2021

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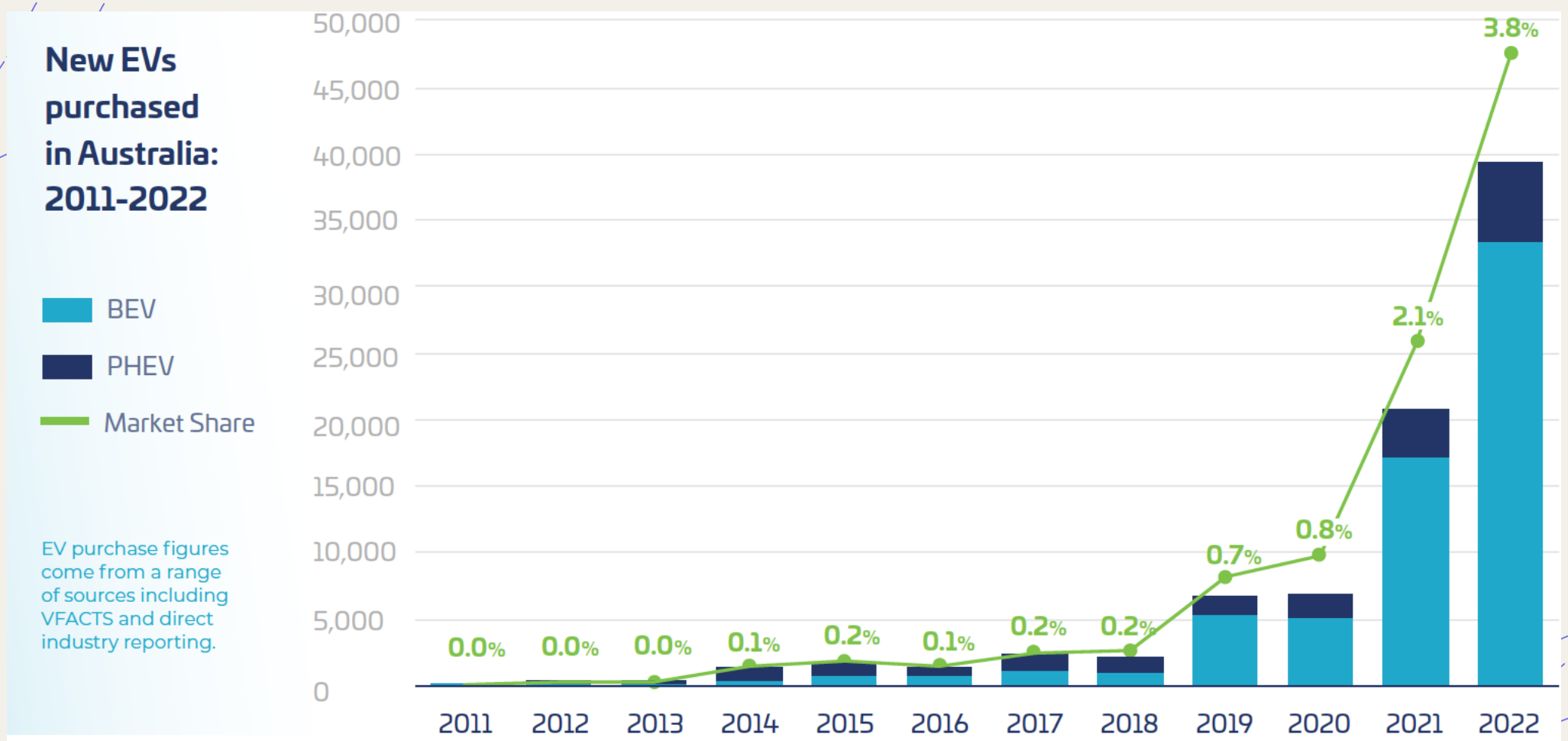
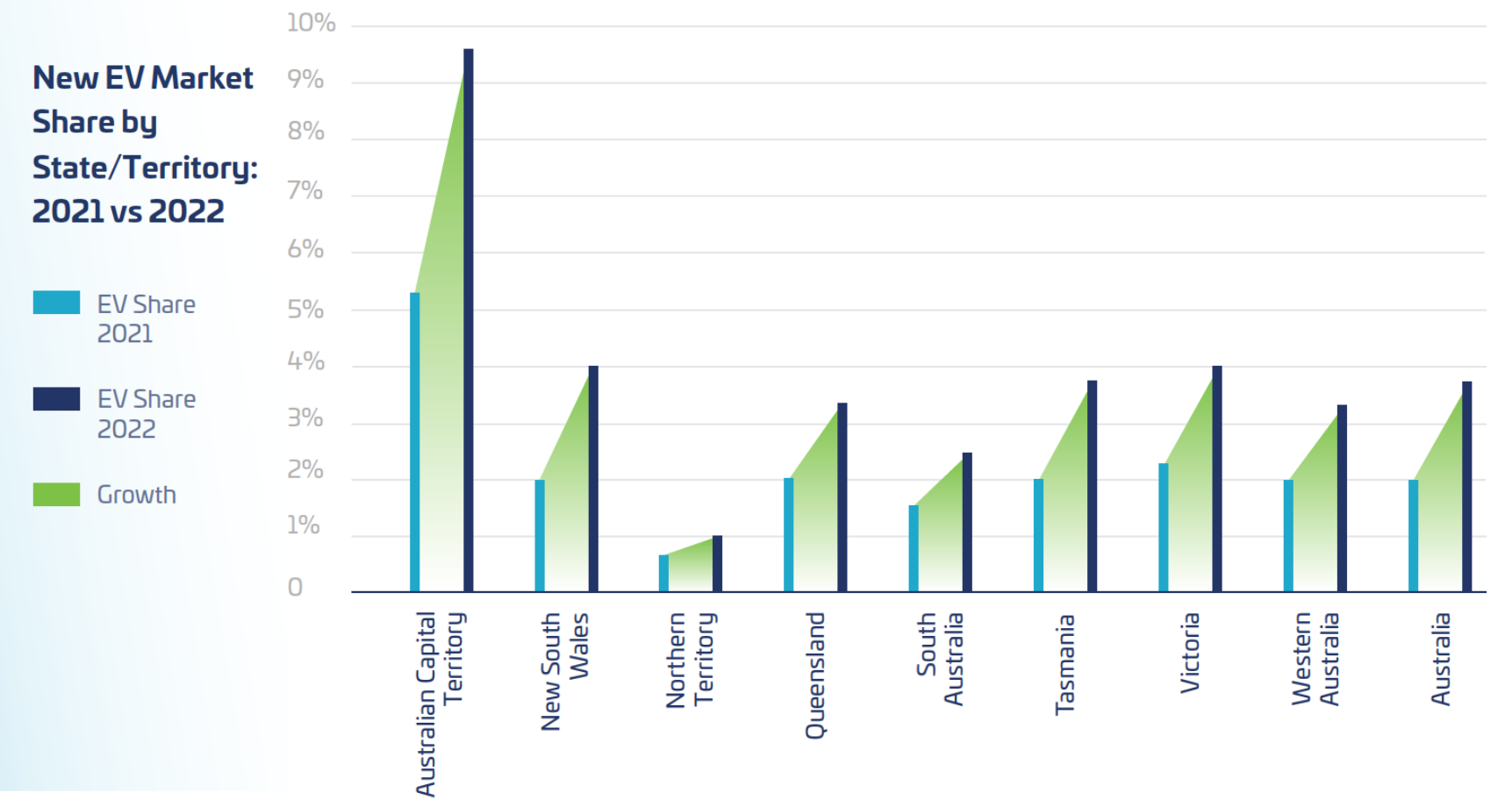
EV sales are rising fast in Australia



Source: Electric Vehicle Council, 2022

EV sales within Australia



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

Source: Electric Vehicle Council, 2022

Electric vehicles – compared to a few years ago

+Cheaper

+Longer range (km)

+Wider variety of models

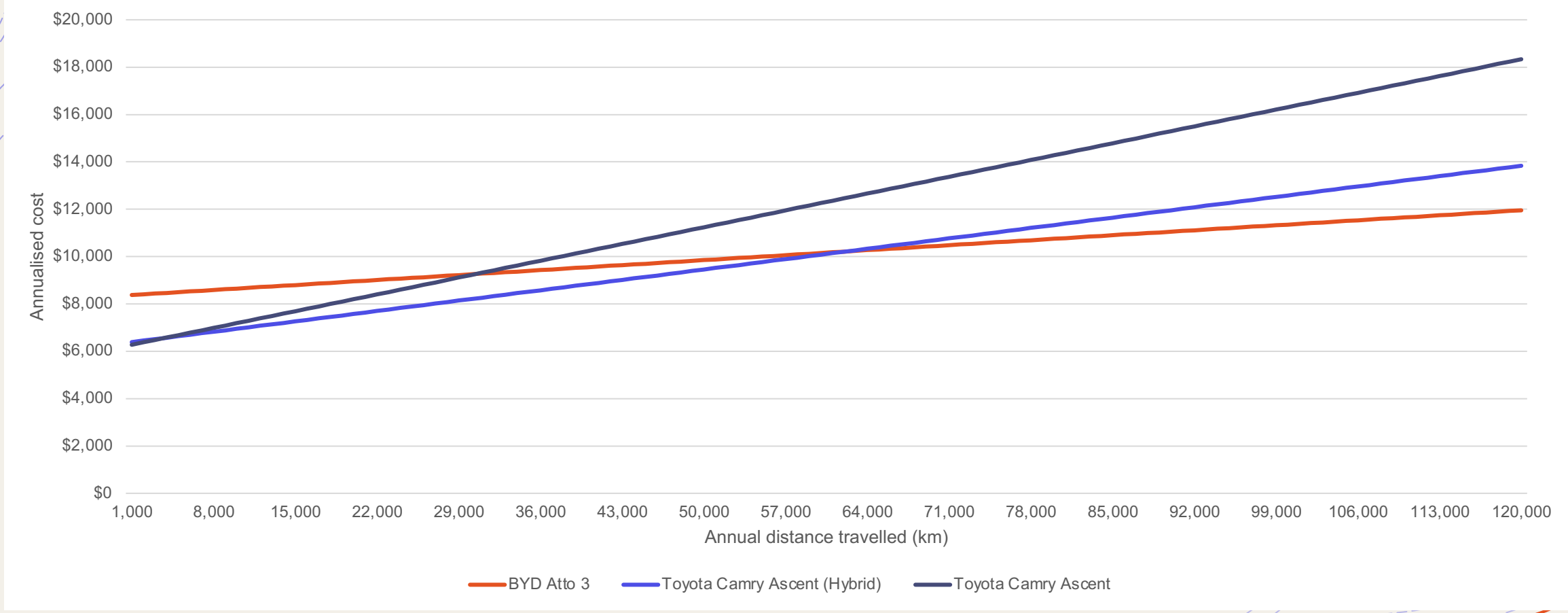
+Increased charging opportunities

+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



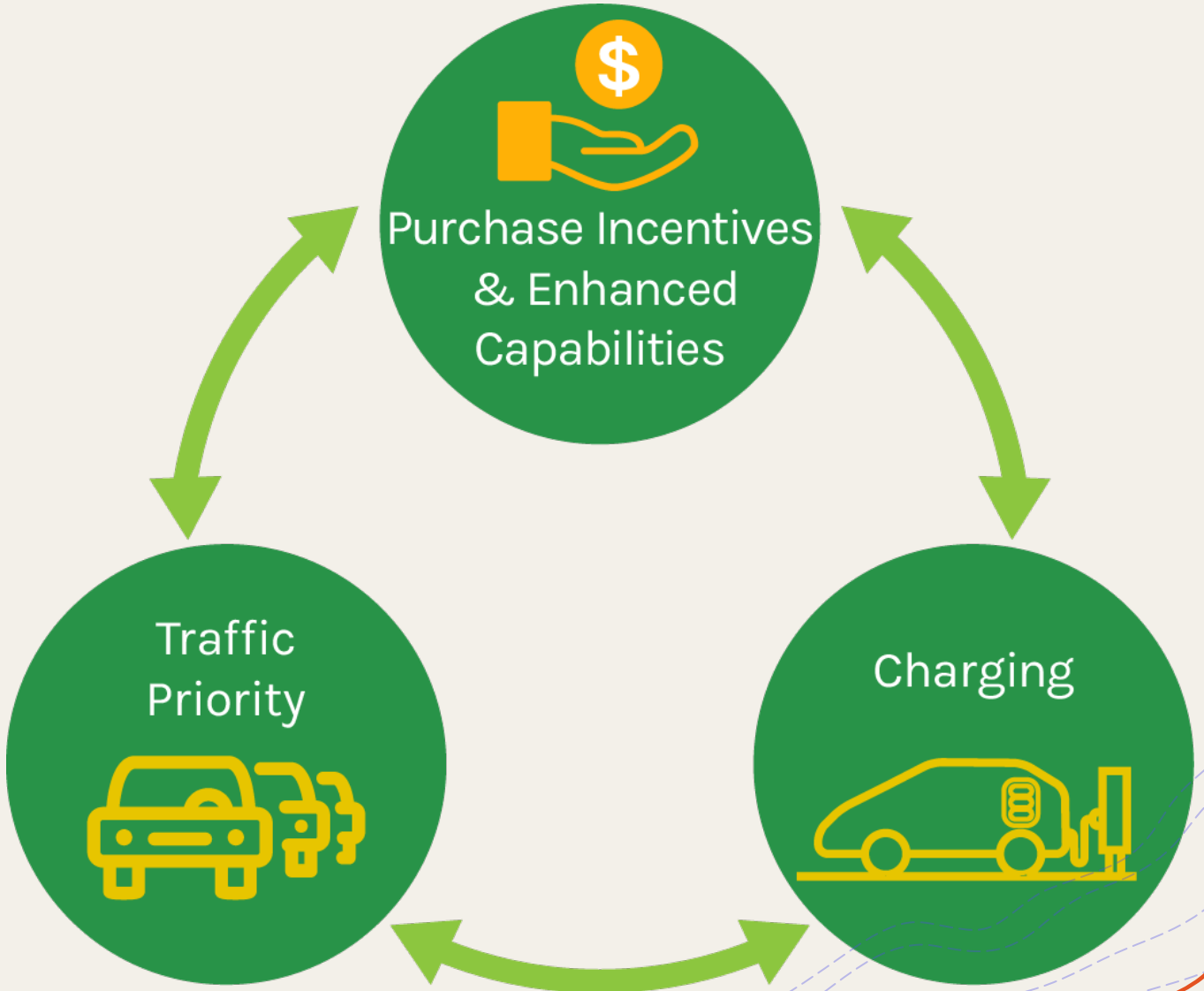
Key trends

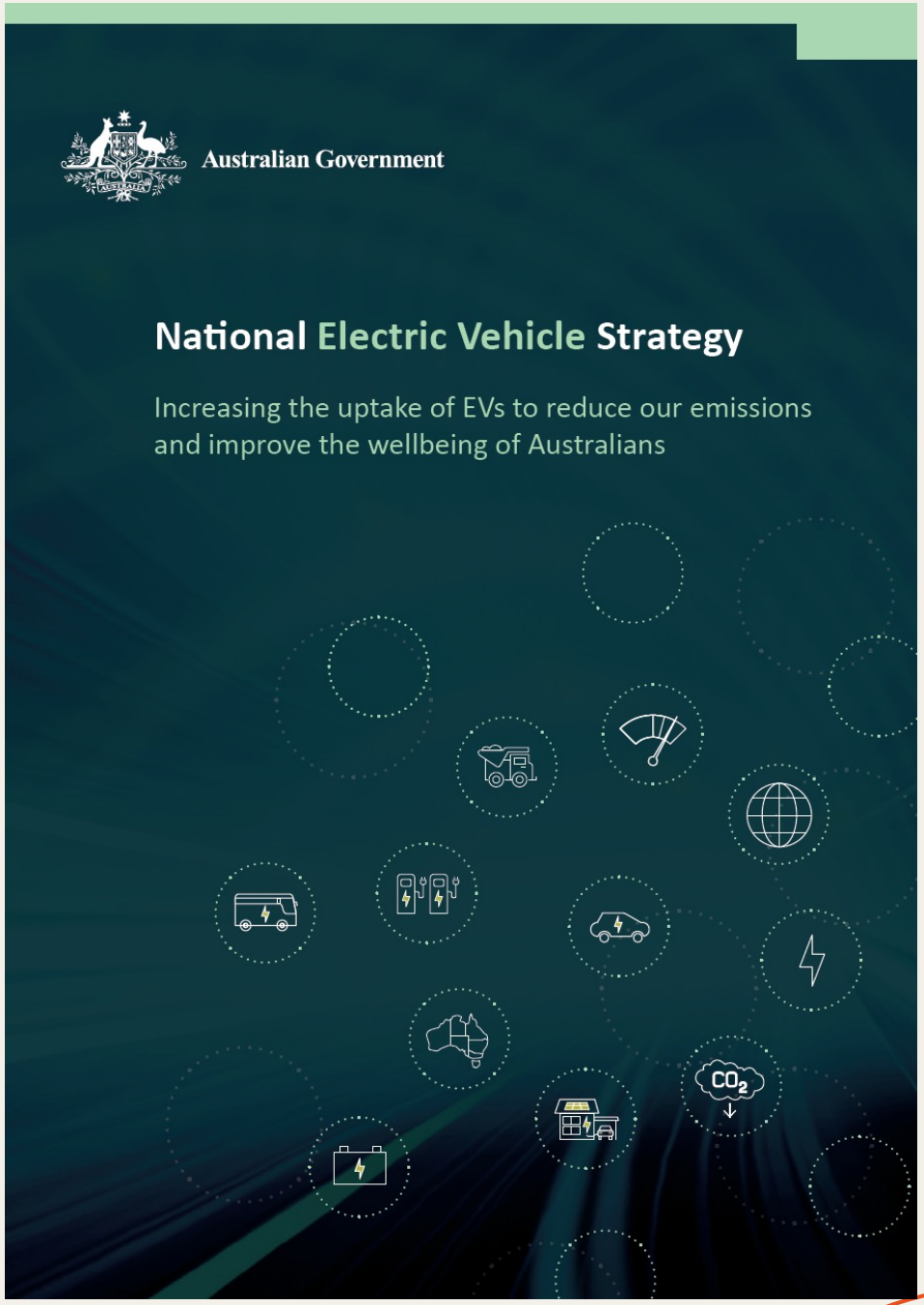
- Cheaper batteries, longer life, and greater energy density
- Faster charging
- Market differentiation - shorter range (100-200km) + longer range (600km+)
- Cheaper domestic chargers
- Smarter chargers + solar interactive

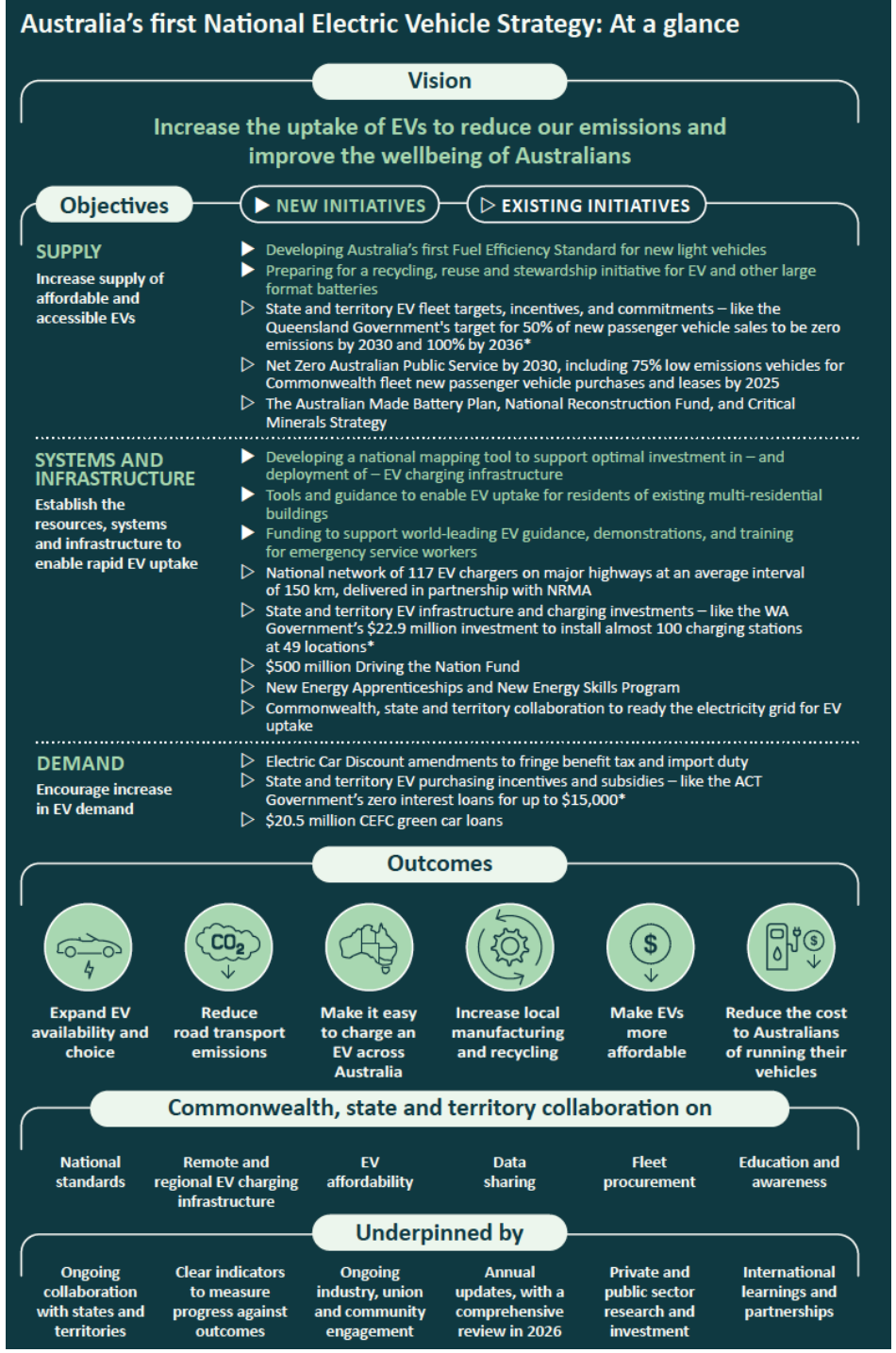
Bi-directional charging

Solar roofs

Key factors influencing EV adoption




Australian Government
National Electric Vehicle Strategy
Increasing the uptake of EVs to reduce our emissions and improve the wellbeing of Australians
CO_2



The one big thing?

Fuel Efficiency Standards for new light vehicles

Charging infrastructure

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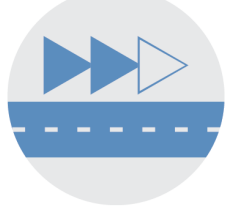
Charging infrastructure types



	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

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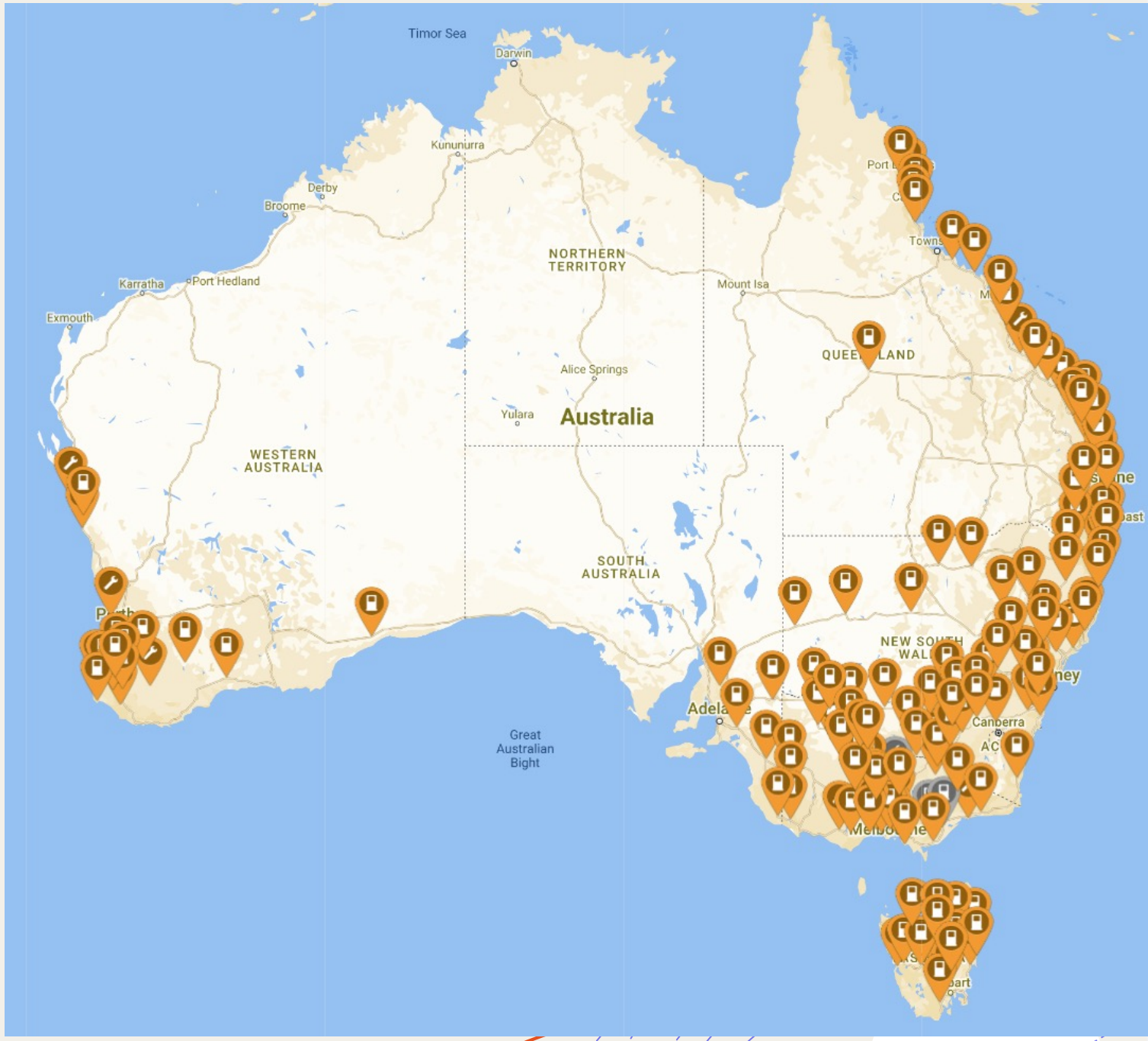
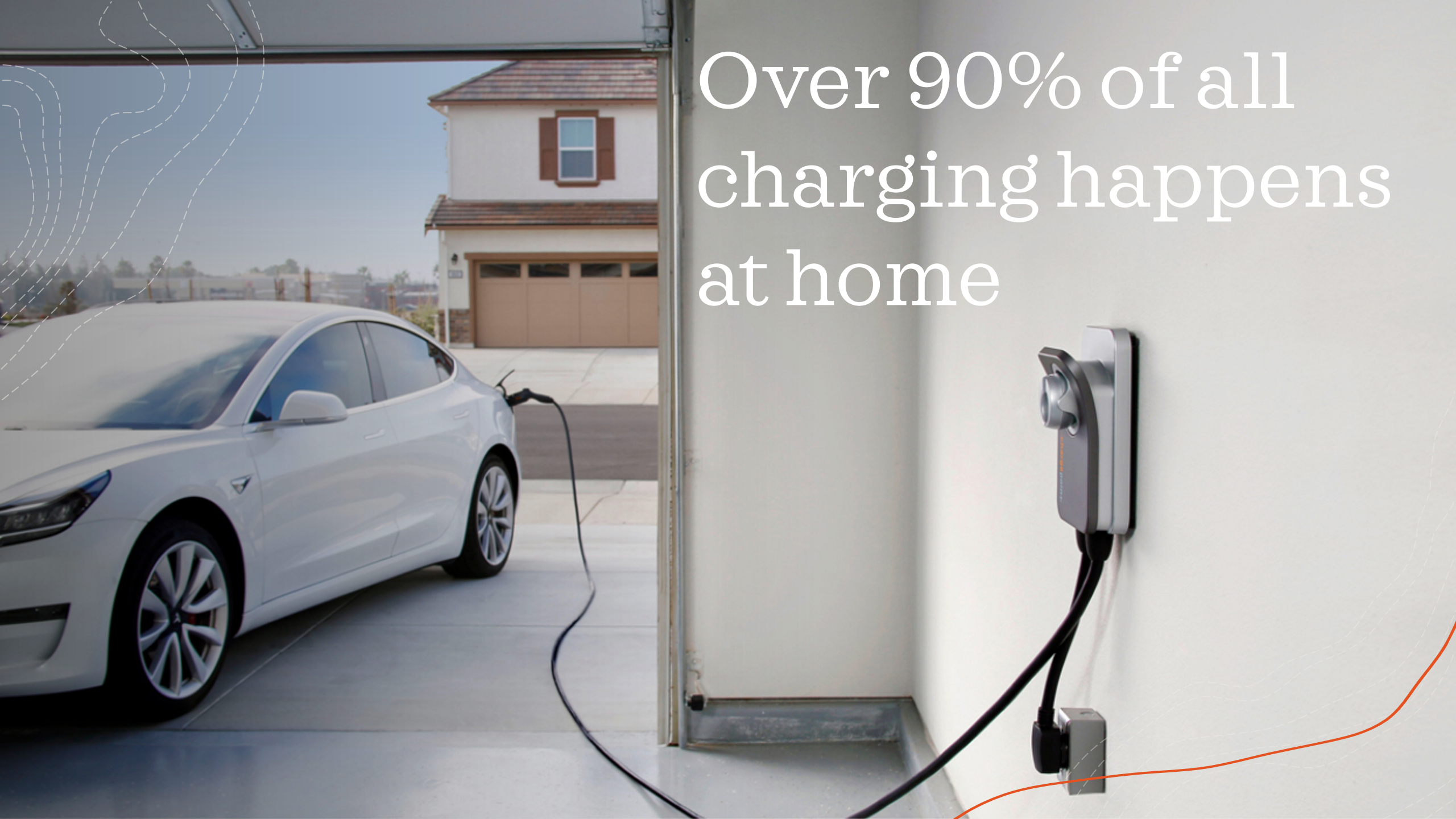
The number of EV charging stations in Australia doubled in the last three years

Source: Plugshare.com

Fast charging




Over 90% of all charging happens at home

1 Passing Through Motorist

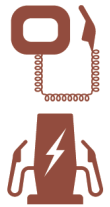
Daniel, needs a recharge to get to his destination

150kW - 350kW
DC charger

2 Opportunistic

Sam, goes to the shops and tops up while parked

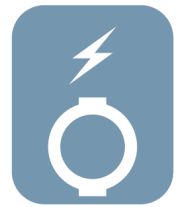
25kW - 50kW
DC charger



3 Local Resident

Cassie, does not have a garage for charging

7kW
charger



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EV CHARGING MAP

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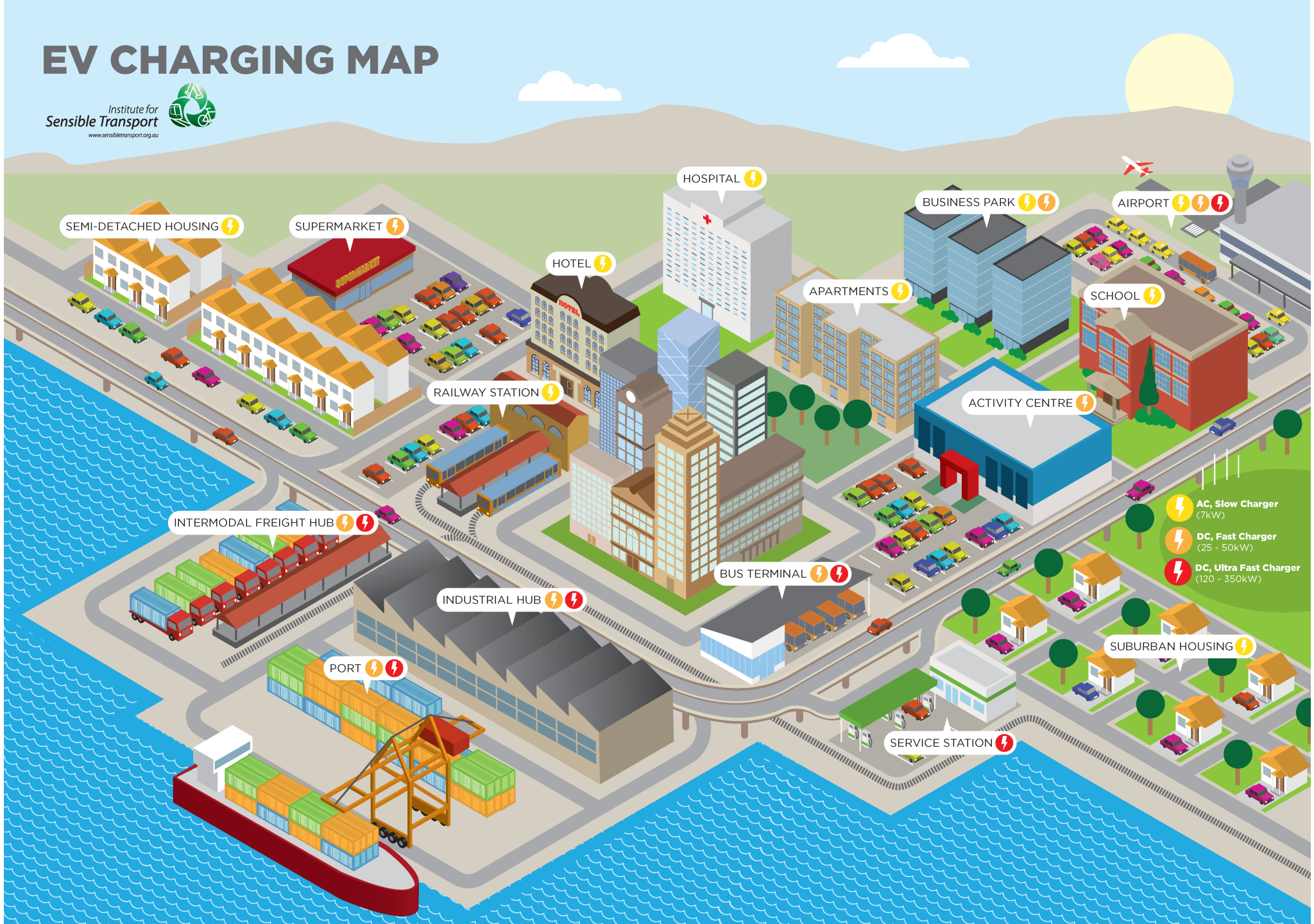
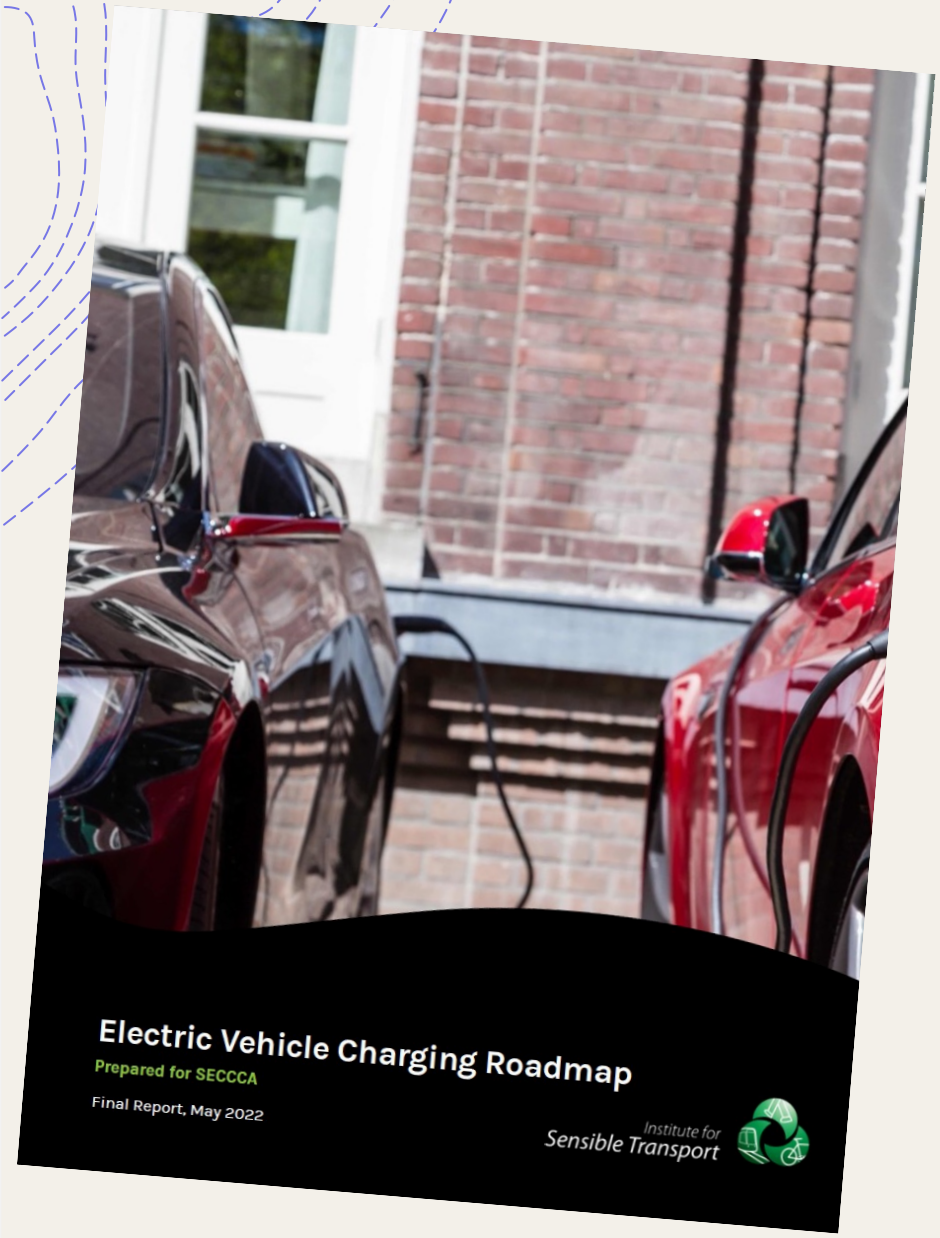
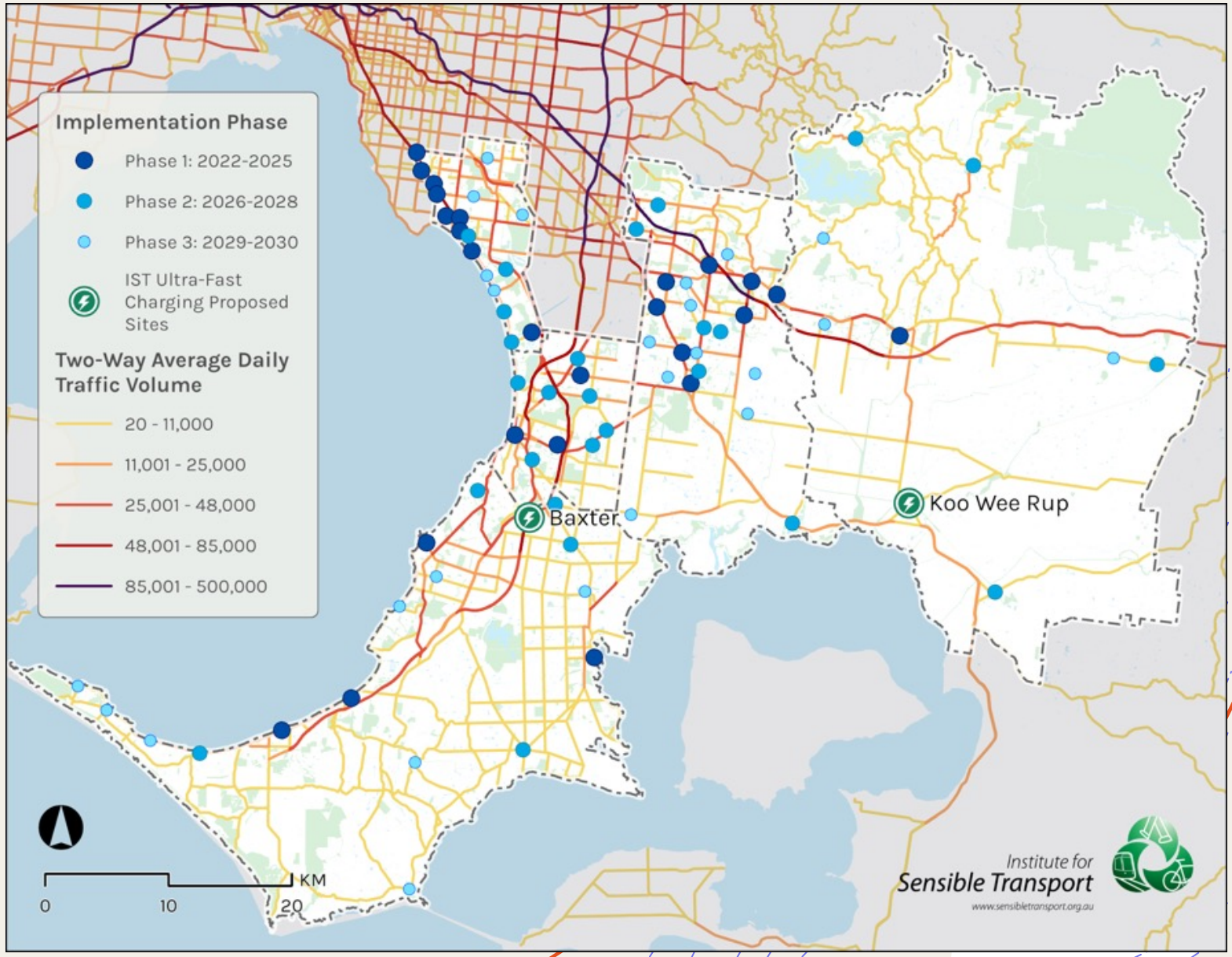
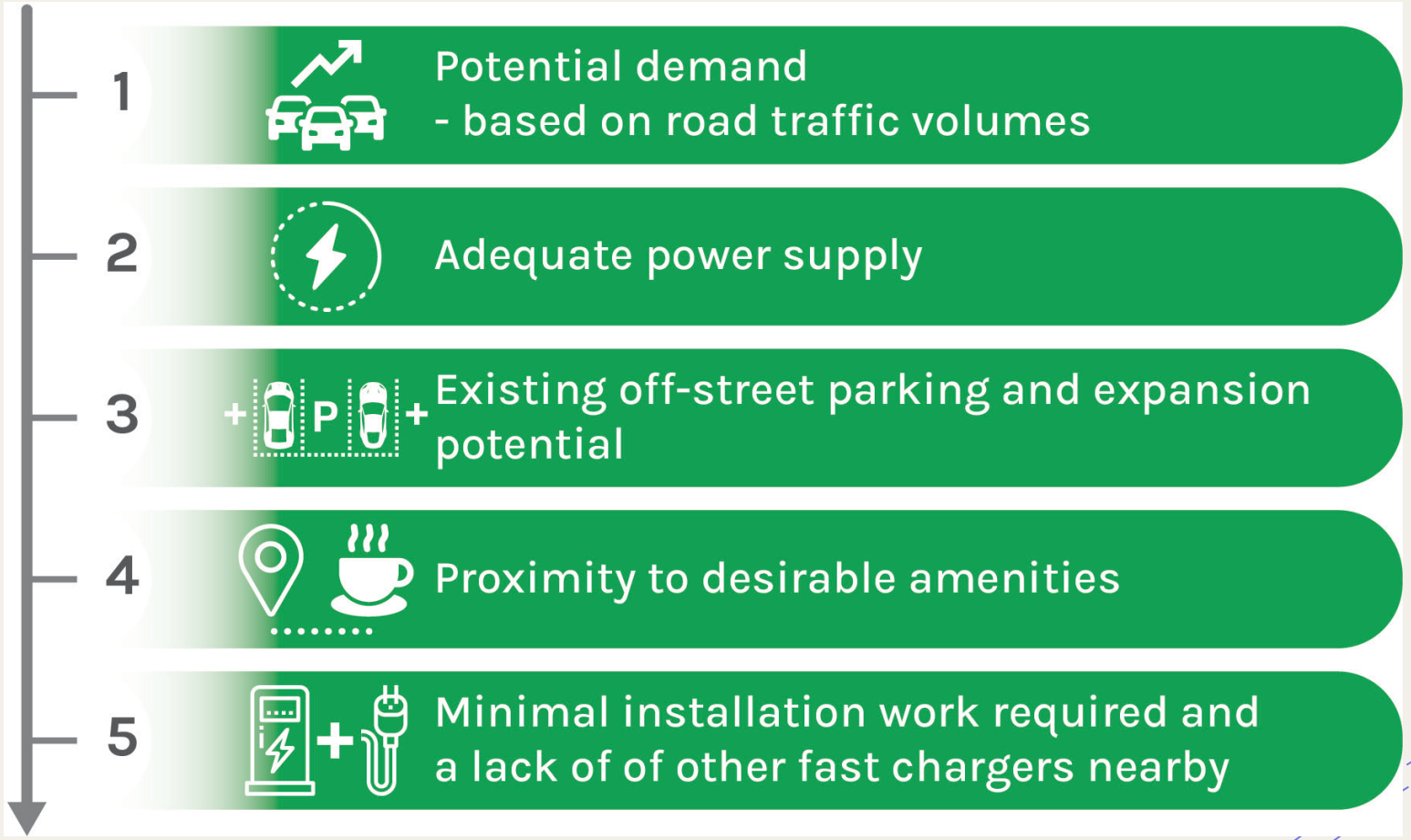


SECCCA EV Charging Roadmap



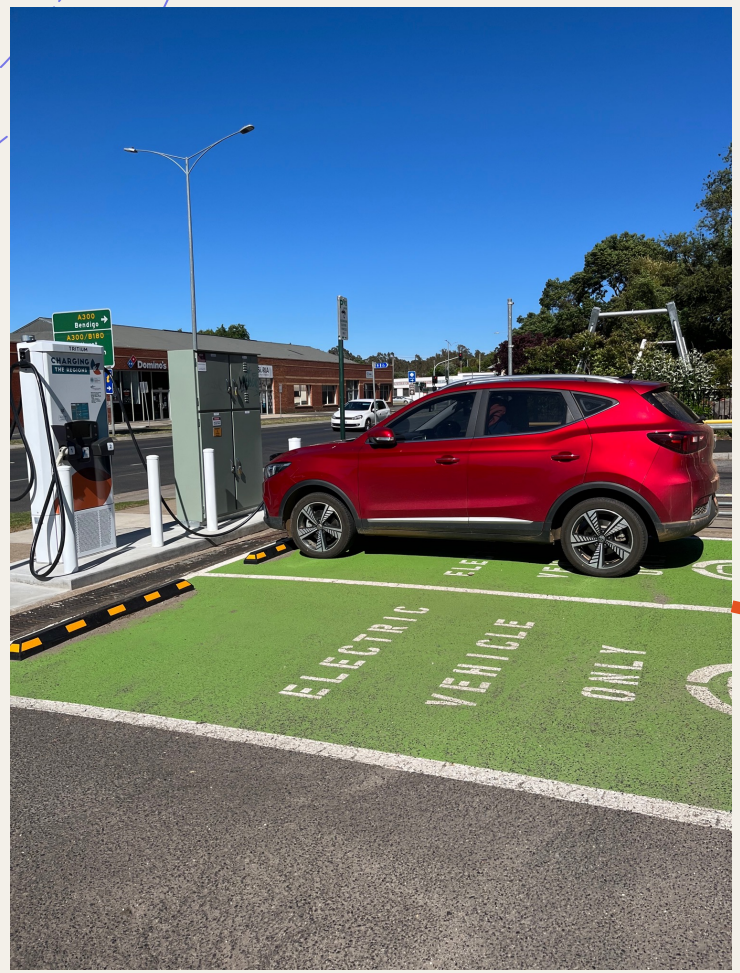


Prioritisation Framework > Passing through motorist



Prioritisation Framework > Opportunistic

Best practice example



How to forecast EV ownership at the local government level

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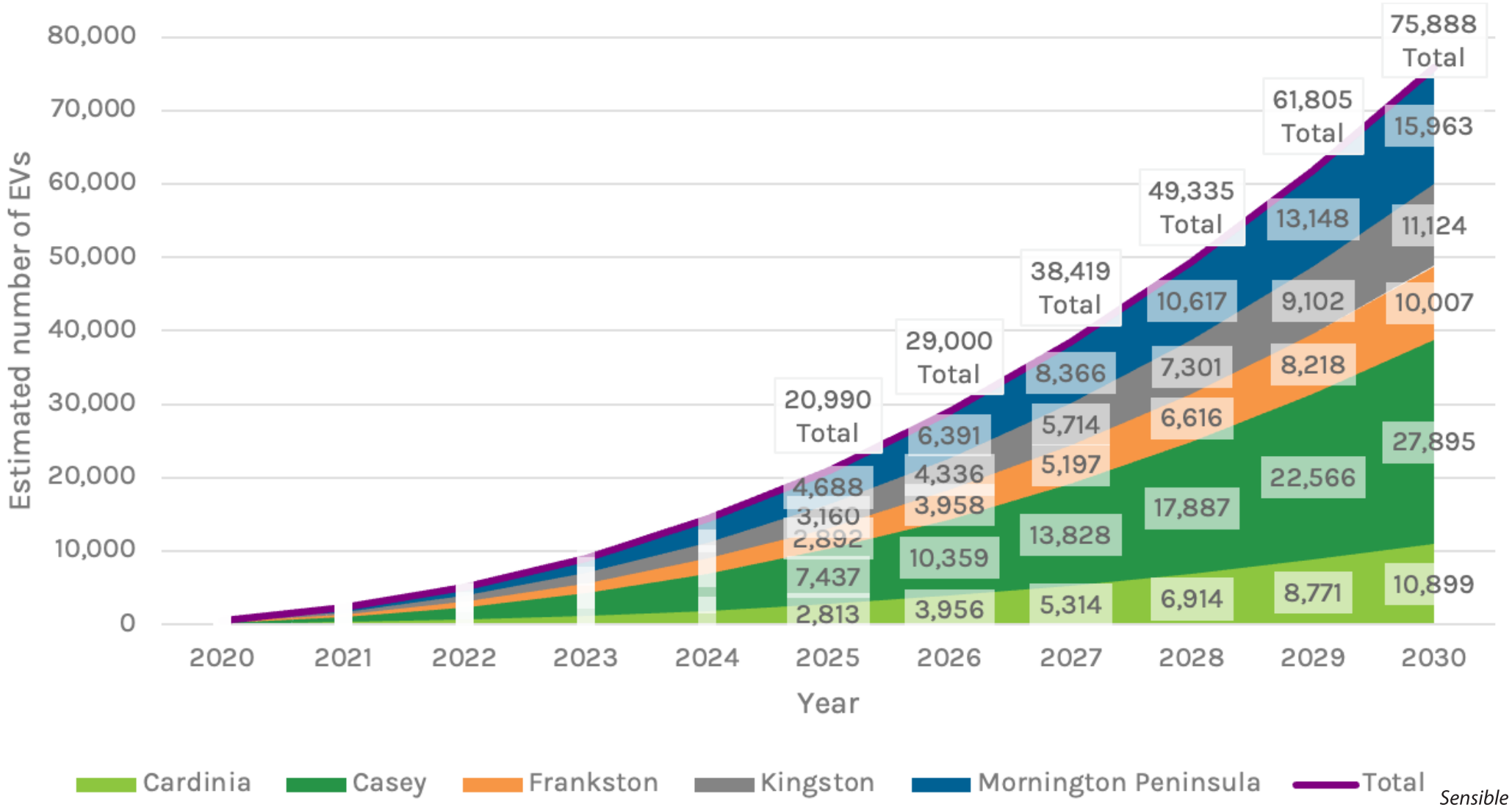
Forecasting EV ownership



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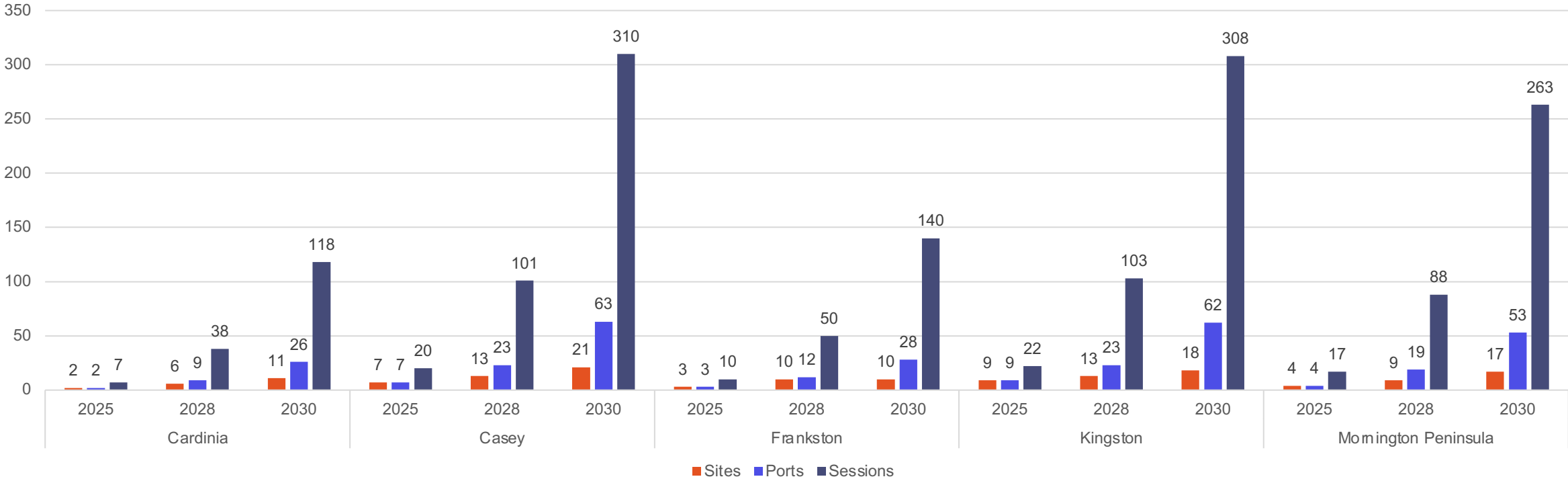
How many charging stations, ports and estimated sessions



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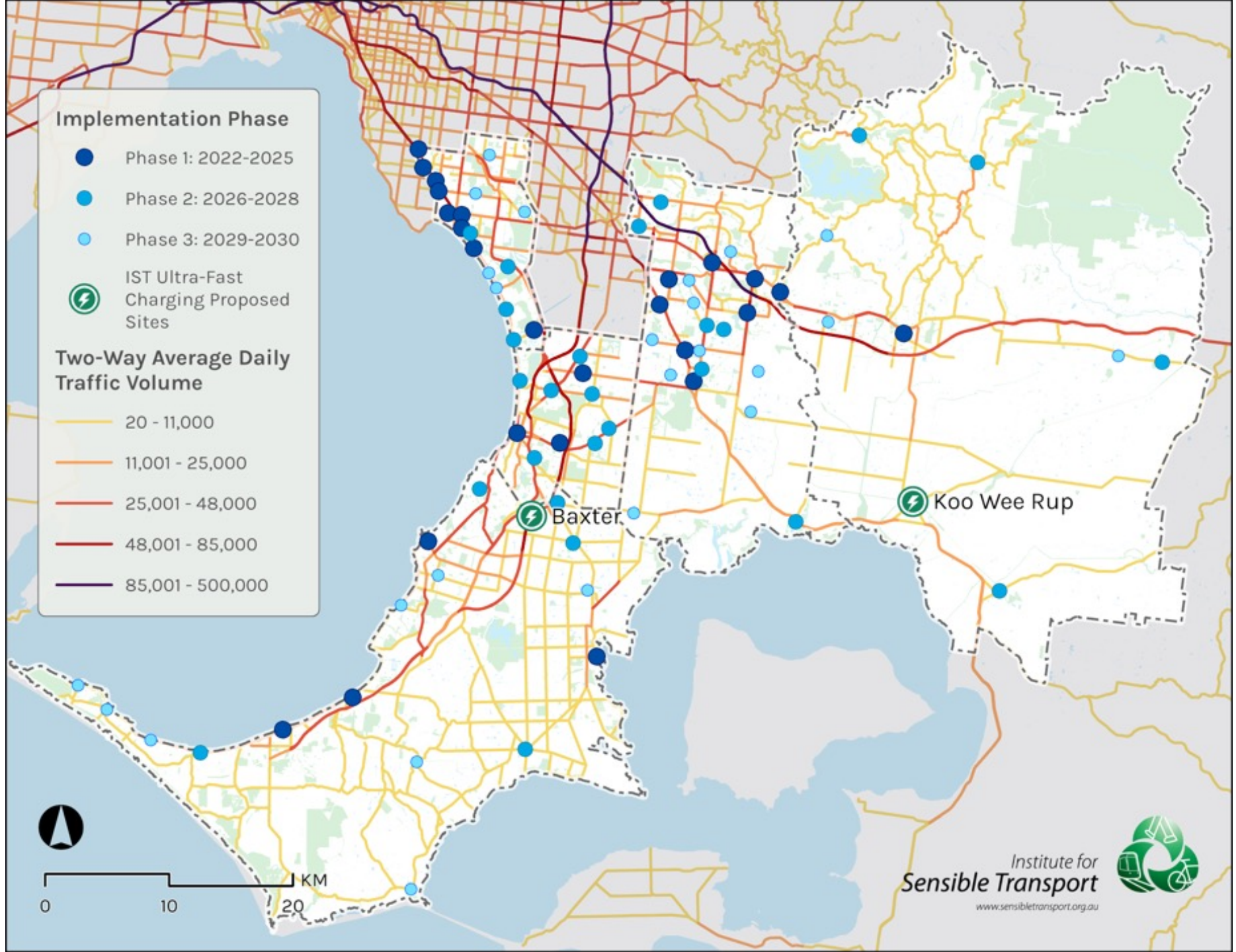
Implementation Phase
Phase 1: 2022-2025
Phase 2: 2026-2028
Phase 3: 2029-2030
IST Ultra-Fast Charging Proposed Sites
Two-Way Average Daily Traffic Volume
20 - 11,000
11,001 - 25,000
25,001 - 48,000
48,001 - 85,000
85,001 - 500,000
Baxter
Koo Wee Rup
KM
0
10
20
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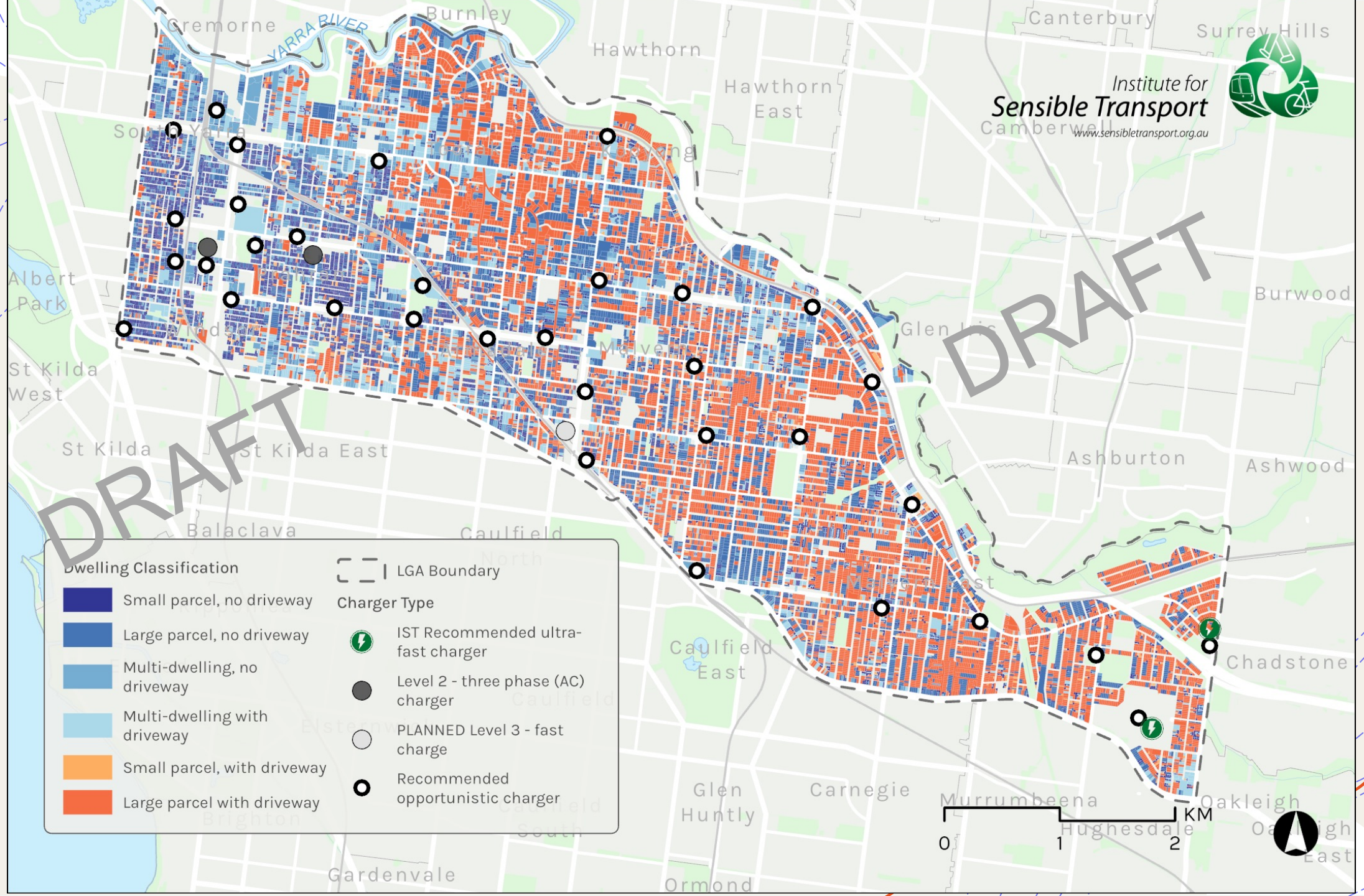
What about households without off street parking?

Prioritisation Framework > Residential

1.  Cluster of house typolgies that makes off-street charging difficult
2.  Close to where these residents would typically park overnight
3.  Can be installed kerbside or off-street
4.  Demand responsive - residents submit online requests form for Council to consider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DRAFT
DRAFT
Dwelling Classification
Small parcel, no driveway
Large parcel, no driveway
Multi-dwelling, no driveway
Multi-dwelling with driveway
Small parcel, with driveway
Large parcel with driveway
LGA Boundary
Charger Type
IST Recommended ultra-fast charger
Level 2 - three phase (AC) charger
PLANNED Level 3 - fast charge
Recommended opportunistic charger
0
1
2
KM
Cremorne
Burnley
Hawthorn
Hawthorn East
Canterbury
Surrey Hills
Camberwell
Albert Park
St Kilda West
St Kilda
St Kilda East
Balaclava
Caulfield North
Caulfield East
Glen Huntly
Carnegie
Murrumbeena
Hughesdale
Oakleigh
Ashburton
Ashwood
Chadstone
Burwood
Glen Iris
Gardenvale
Ormond
Brighton
YARRA RIVER

Solutions for households without EV charging options on site

Source: Intellihub


London


Netherlands


Oslo

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?

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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

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No war on tradies and no ruined weekend

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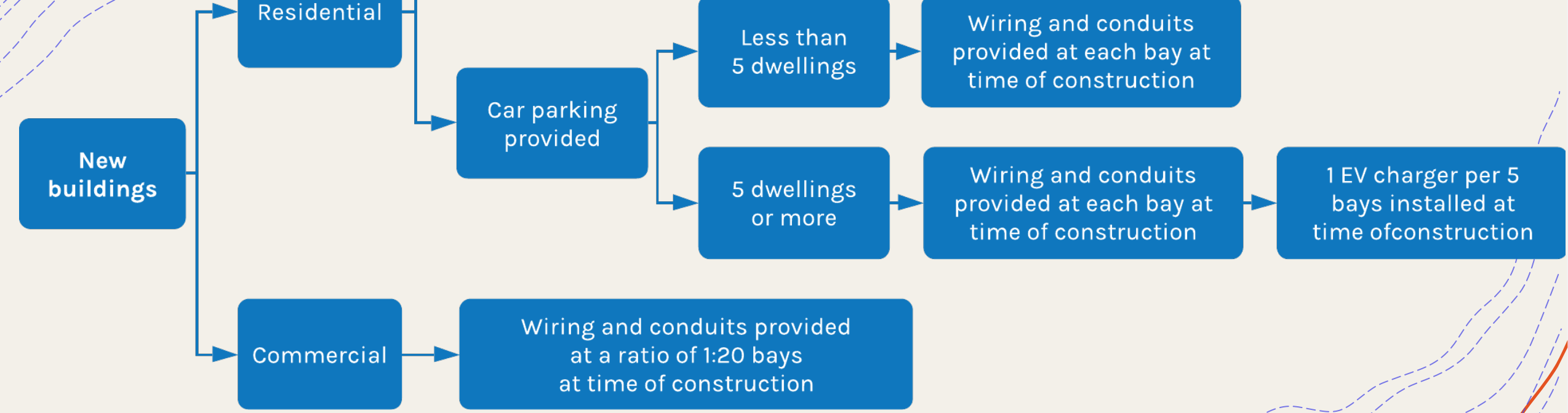
New buildings
Residential
Car free
Investigate EV car share nearby
Car parking provided
Less than 5 dwellings
Wiring and conduits provided at each bay at time of construction
5 dwellings or more
Wiring and conduits provided at each bay at time of construction
1 EV charger per 5 bays installed at time ofconstruction
Commercial
Wiring and conduits provided at a ratio of 1:20 bays at time of construction