A large yellow chevron graphic pointing to the right, composed of several parallel diagonal lines, occupies the left side of the slide.

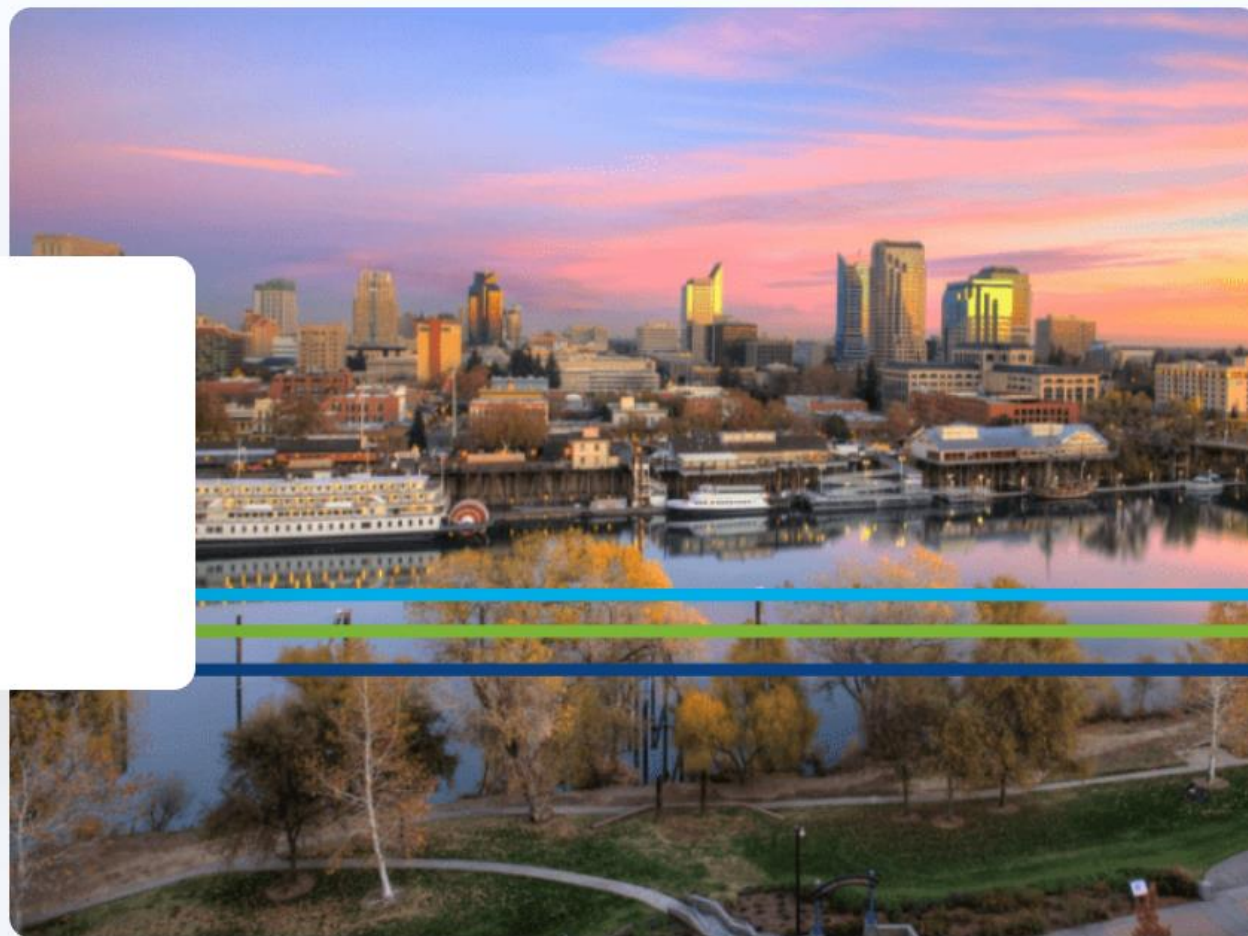
EVS36 — 36th Electric Vehicle Symposium & Exposition and the wider EV context

CILT Central Section, August 2023

Elizabeth Yeaman, Managing Director, Retyna Ltd

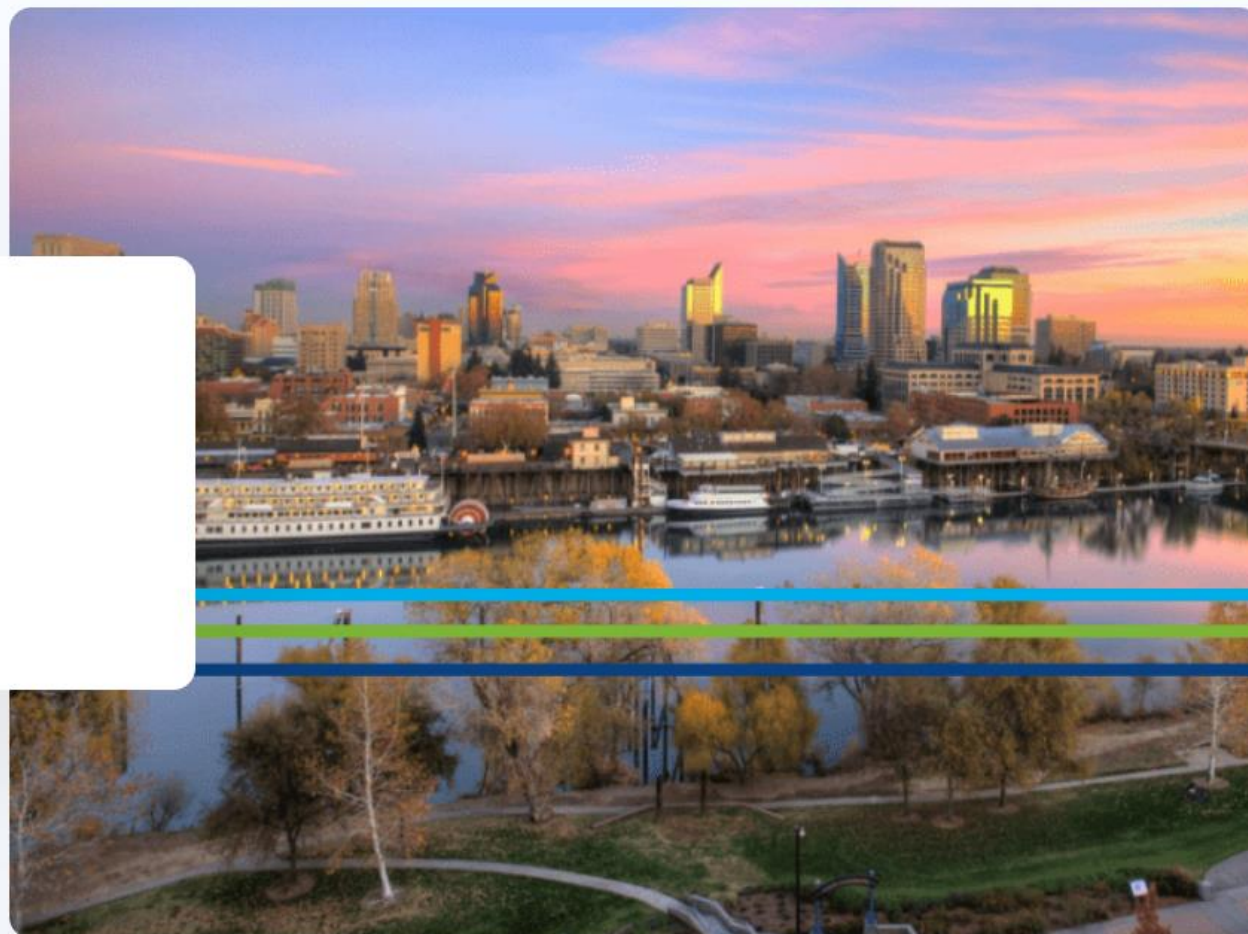
WELCOME TO

Sacramento California



WELCOME TO

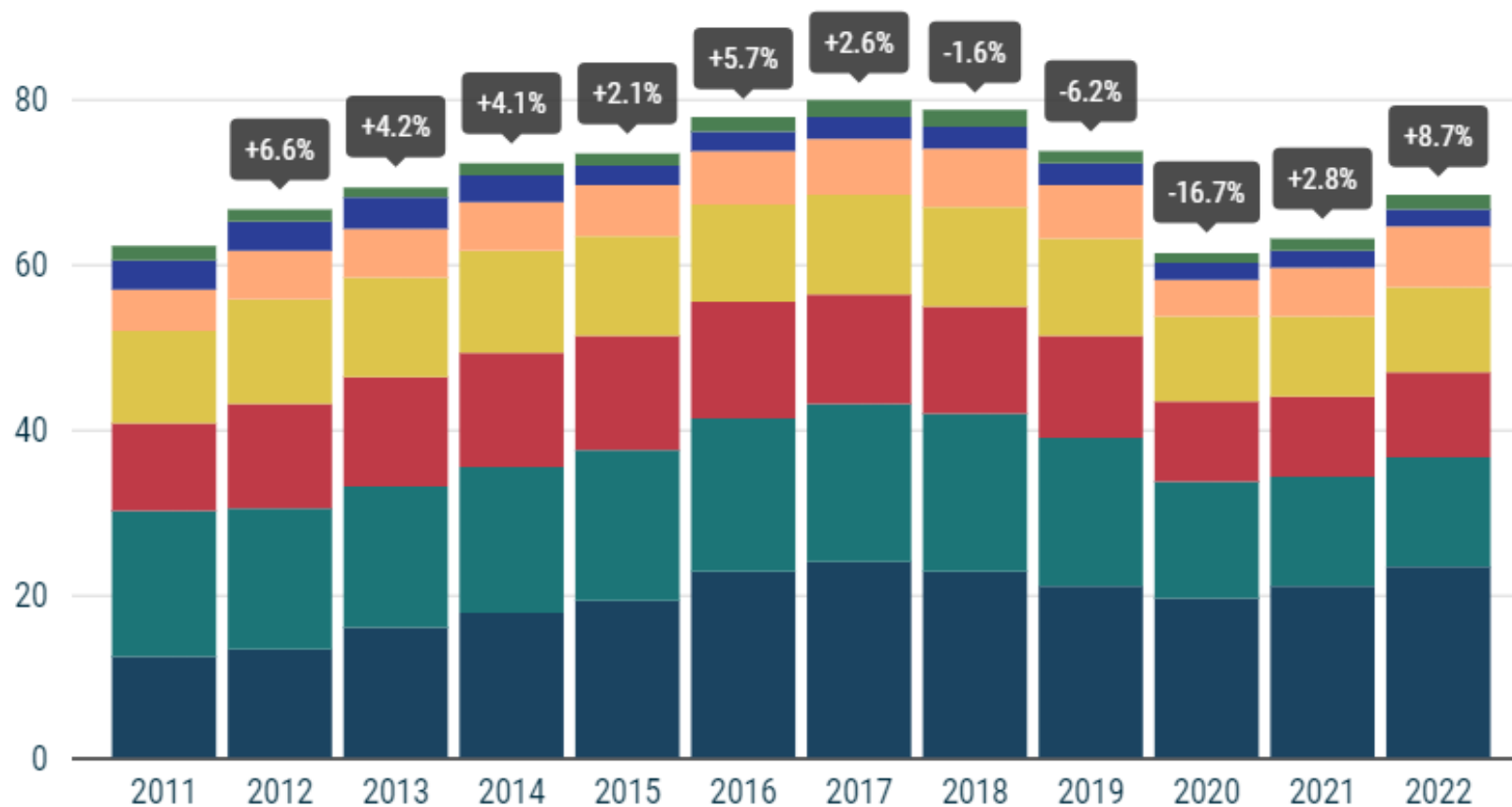
Sacramento
California



WORLD CAR PRODUCTION

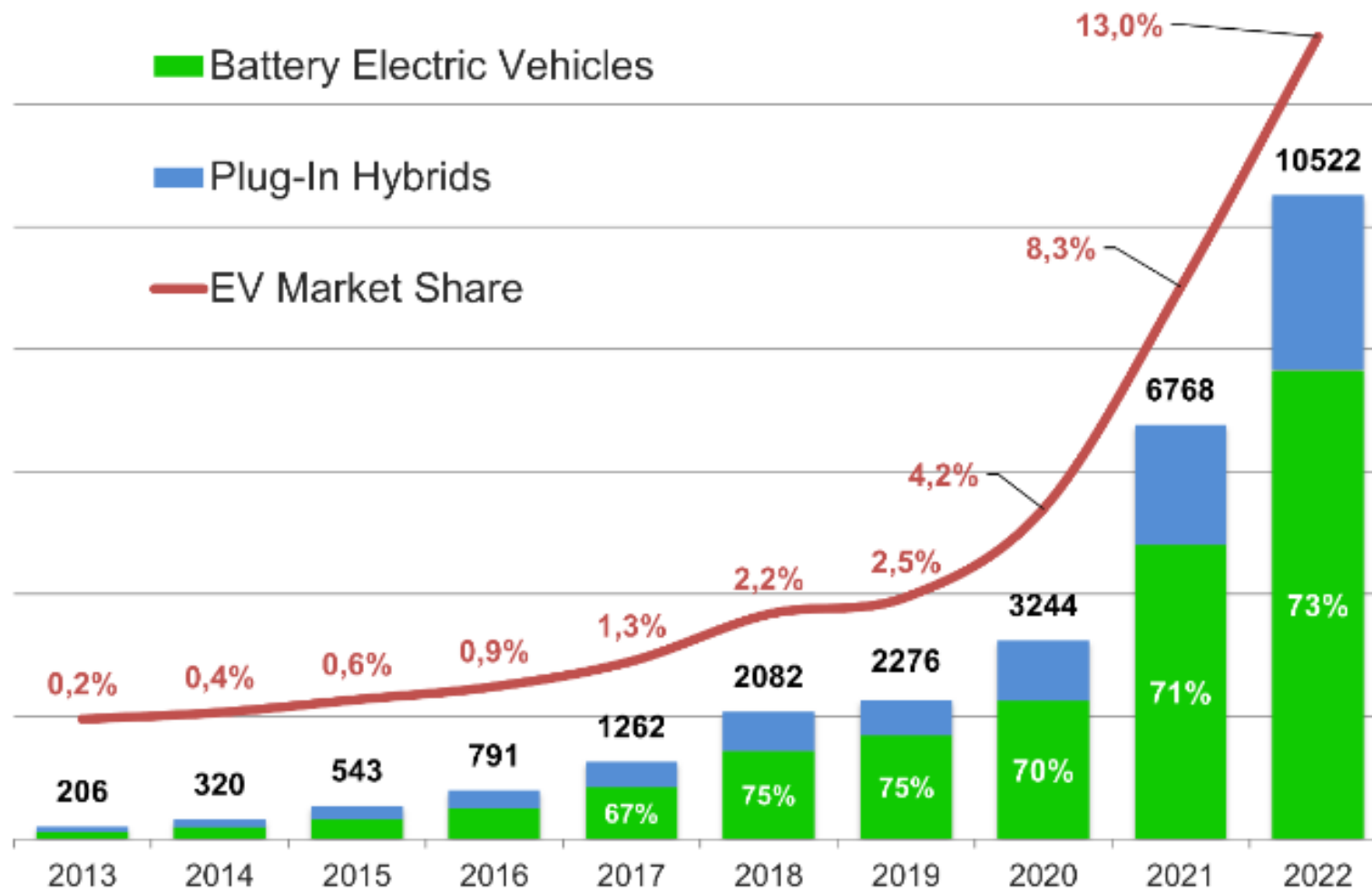
In million units, % change / 2011 – 2022

Greater China Europe North America Japan/Korea South Asia South America
Middle East/Africa

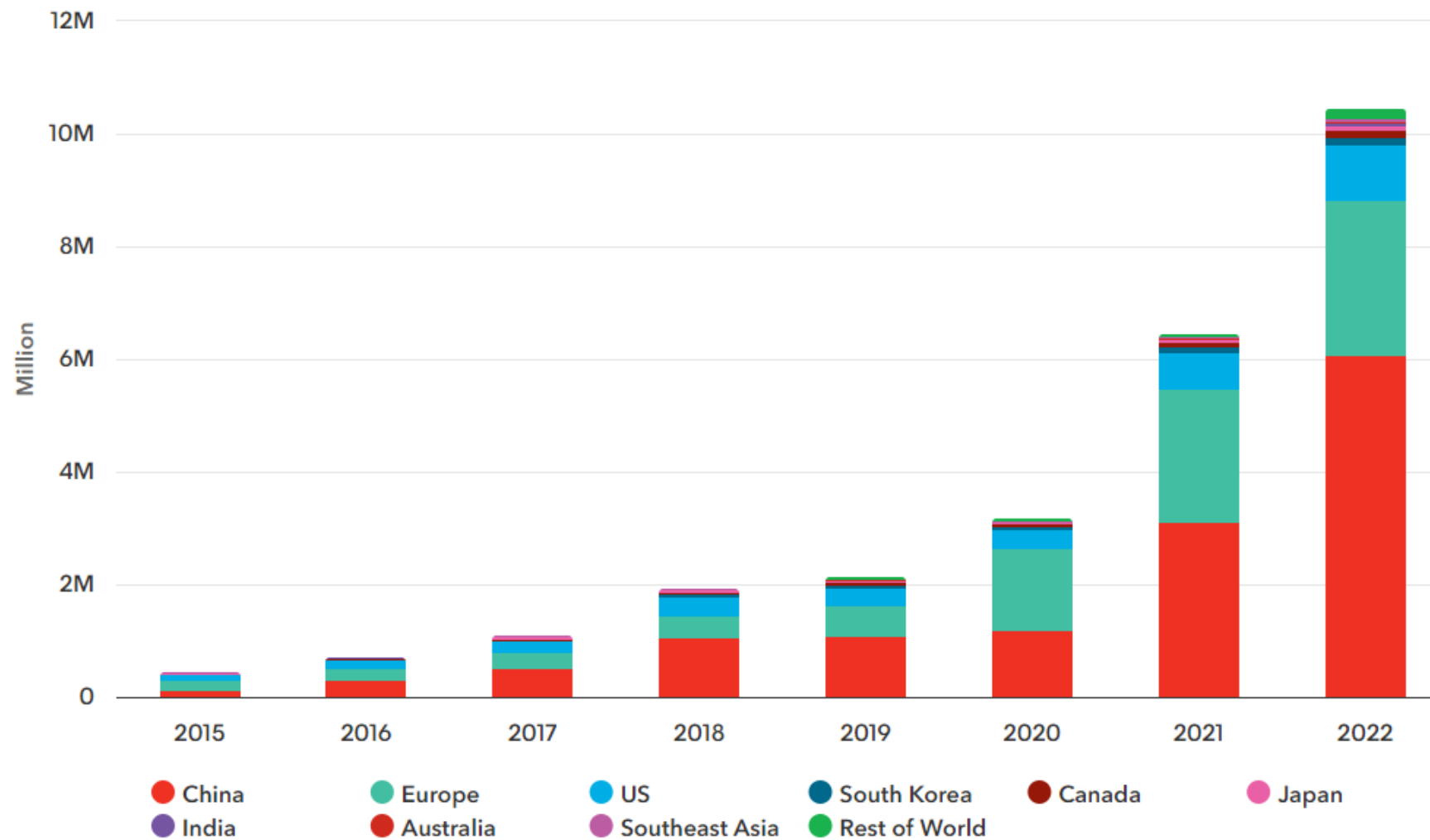


GLOBAL BEV & PHEV SALES ('000s)

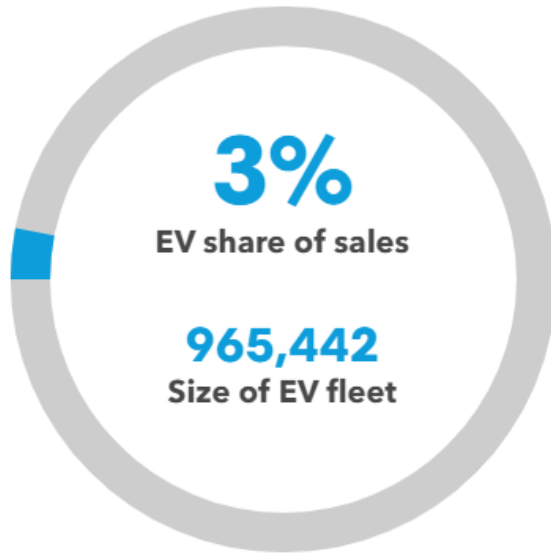
EV VOLUMES



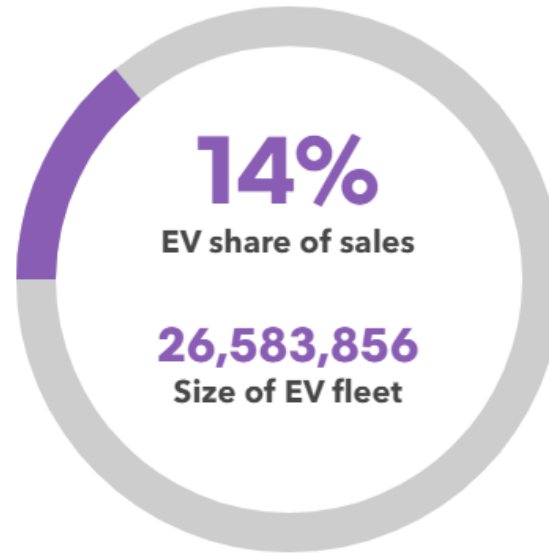
Global passenger EV sales by market



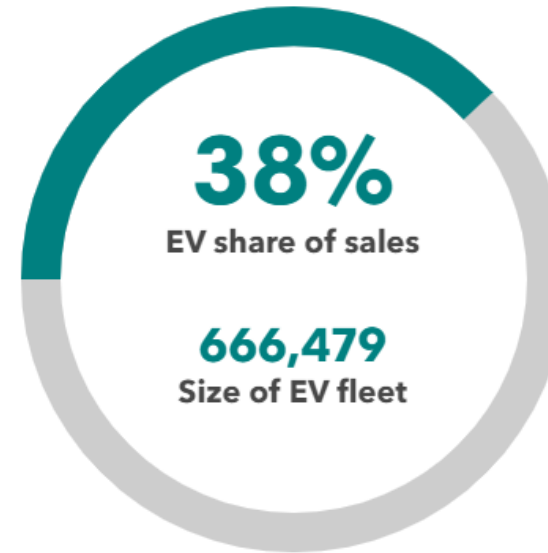
Vans and trucks



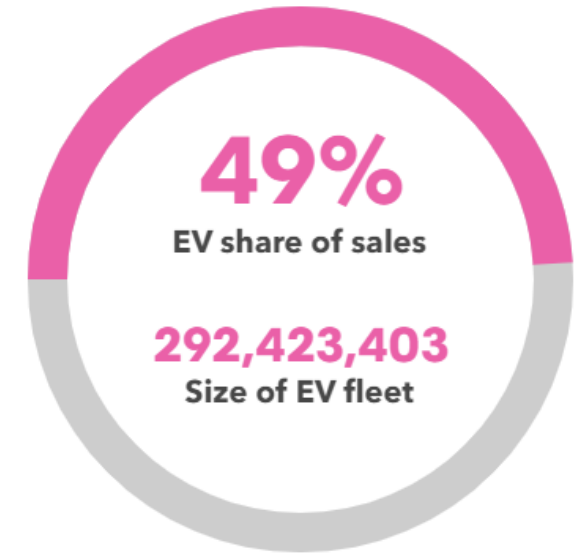
Passenger cars



Buses



2 and 3 wheelers



EVs of all types are already displacing 1.5 million barrels per day of oil usage, equivalent to about 3% of total road fuel demand.

Oil displacement by vehicle segment

Vans and trucks



26,614 Barrels per day

Buses



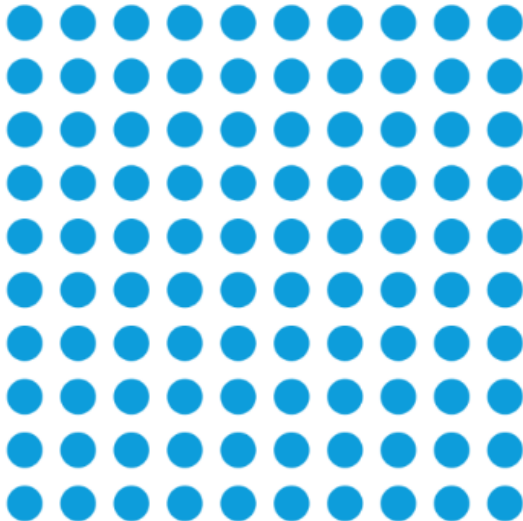
207,482 Barrels per day

Passenger cars



264,382 Barrels per day

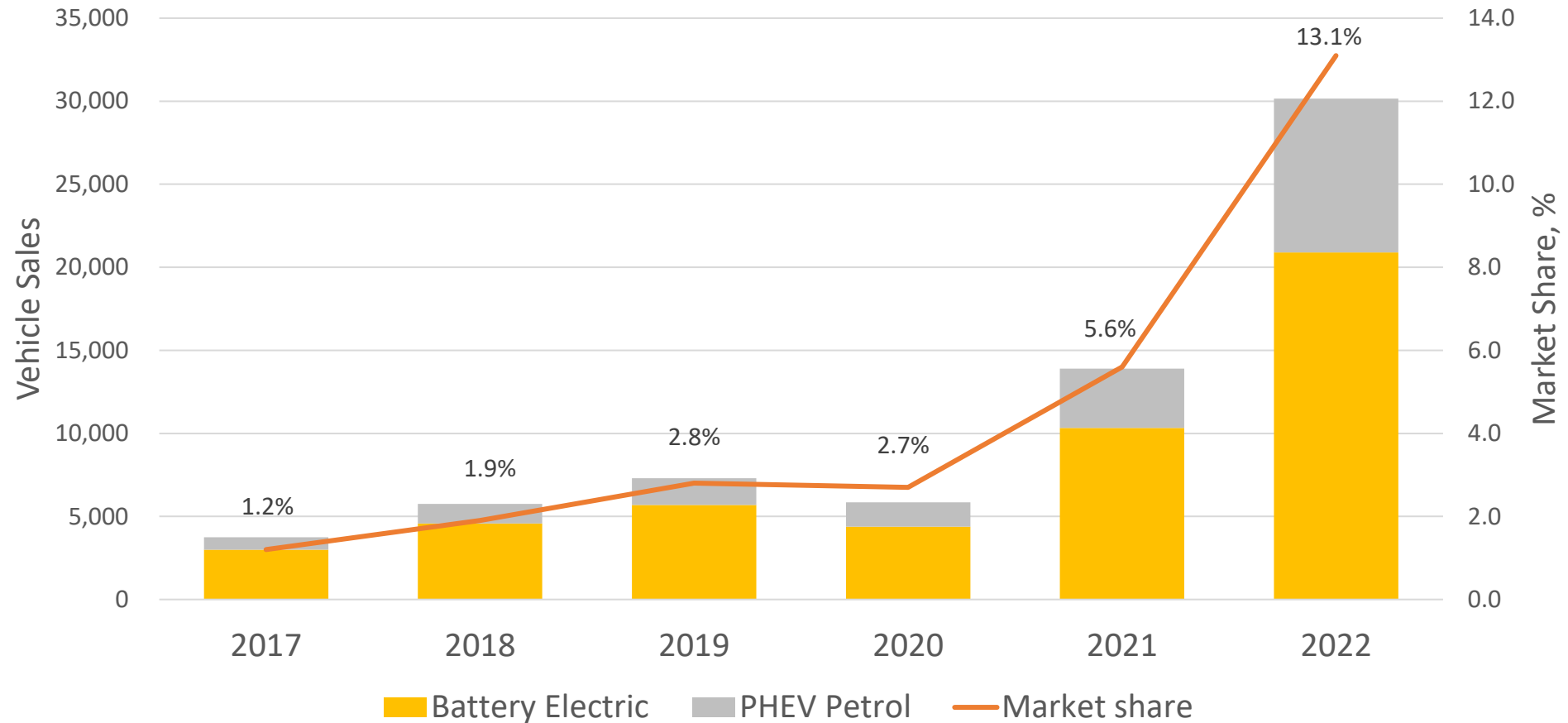
2 and 3 wheelers



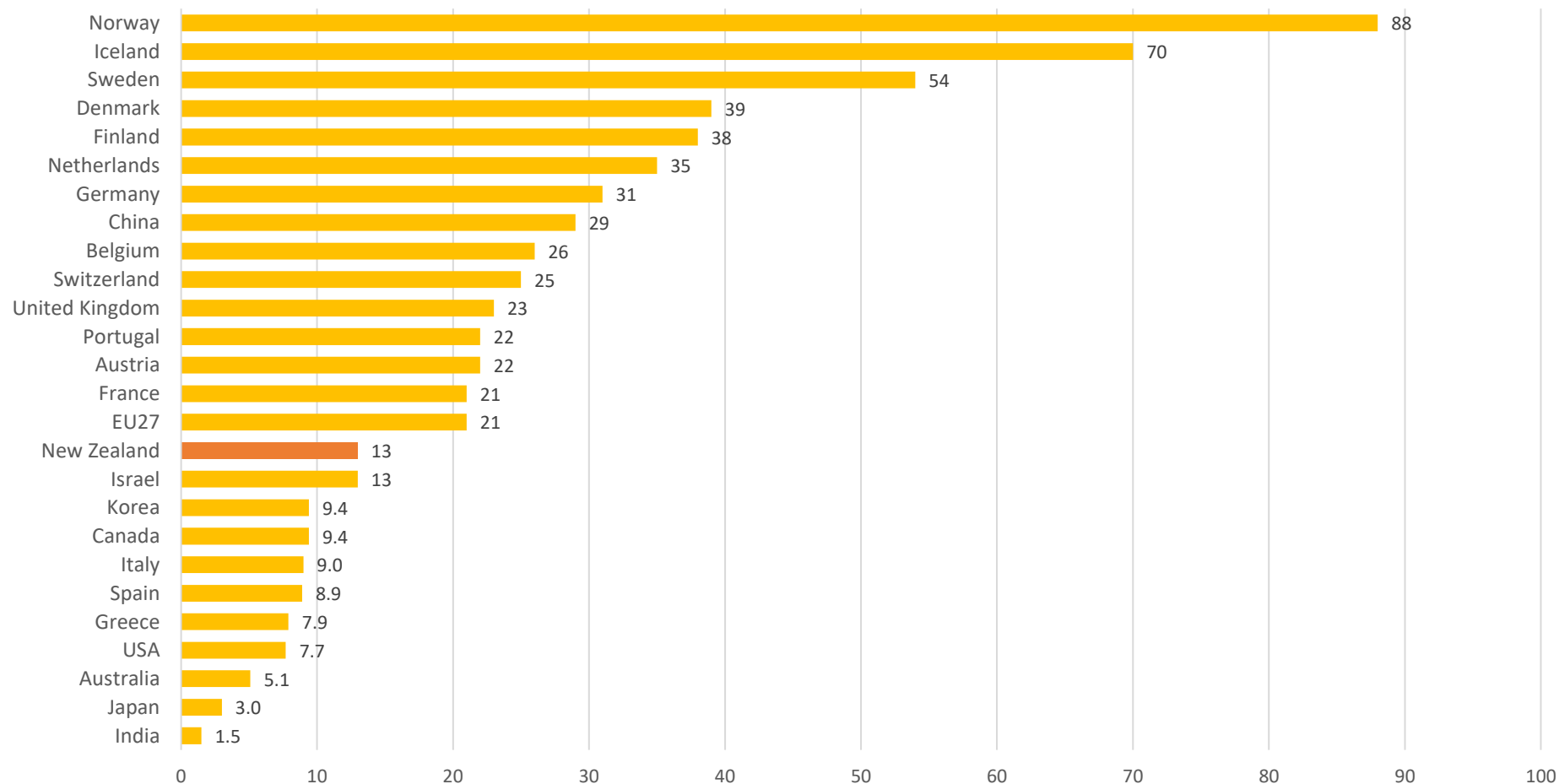
997,230 Barrels per day



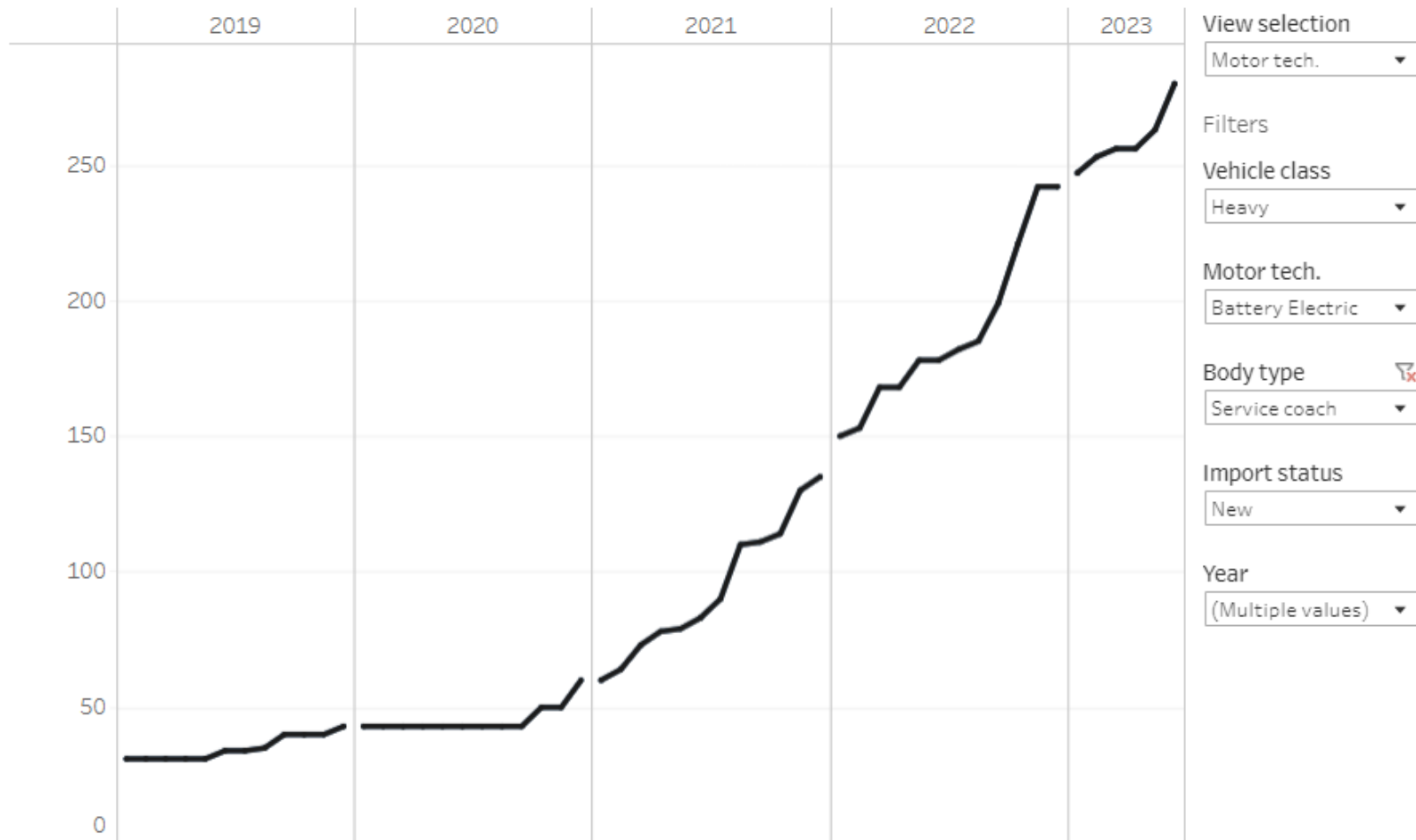
New Zealand light passenger EV sales



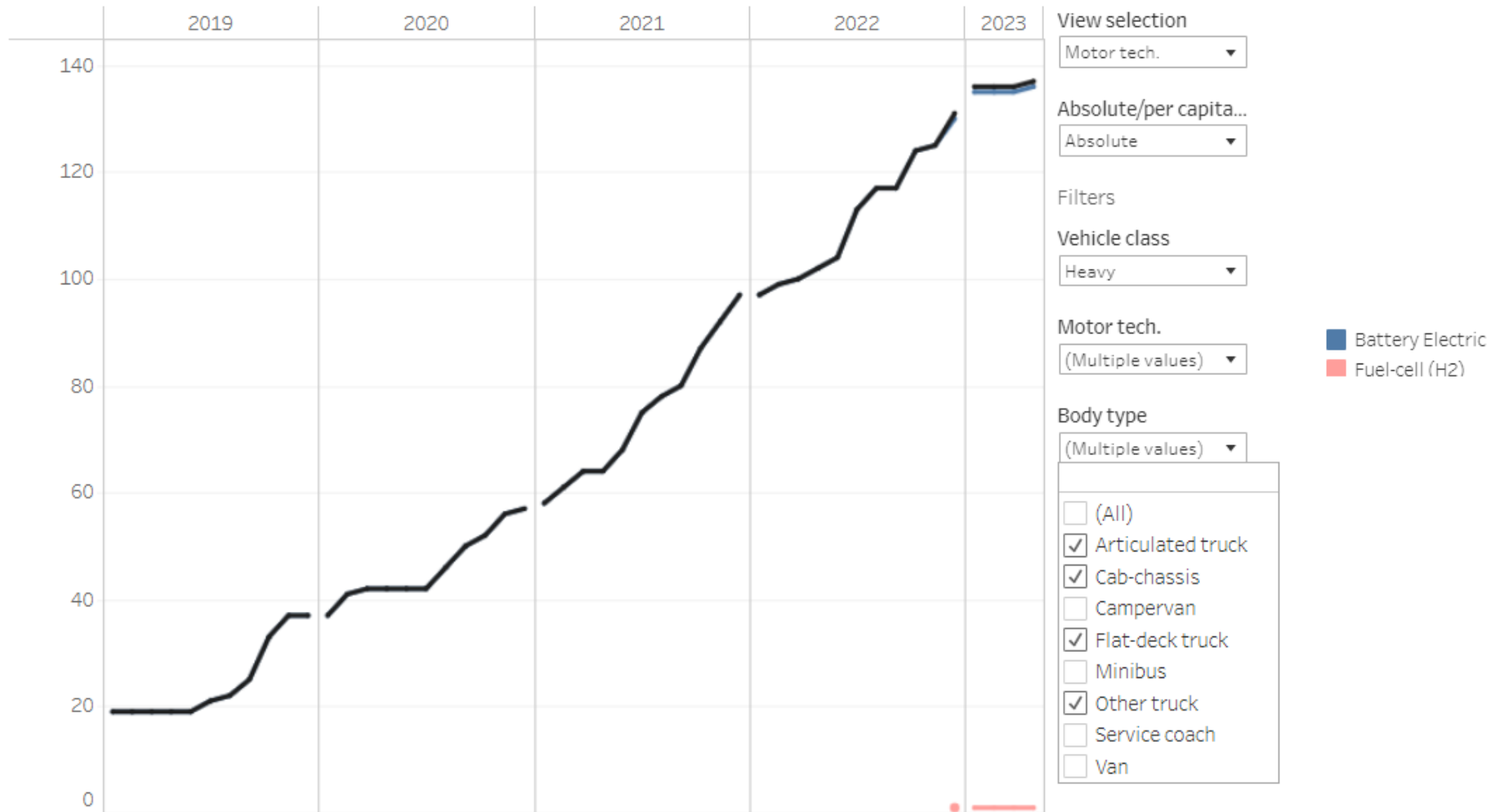
EV car market share % by country, 2022



Total registered electric buses in New Zealand



Total registered electric trucks in New Zealand





General Goal

CO₂ neutral Mobility



CHARIN

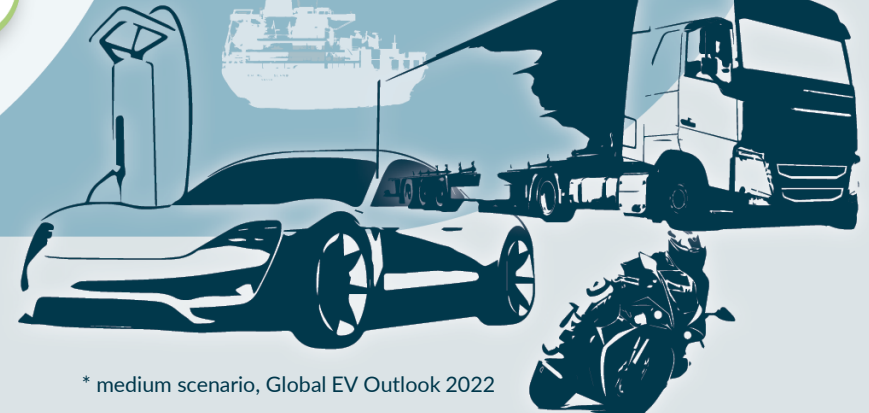
**Solution provided by the
Combined Charging System (CCS)
& Megawatt Charging System (MCS)**



CO₂ neutral
energy



≈270 million EVs in 2030*
≈3 million medium/heavy
duty E-Trucks in 2030*



* medium scenario, Global EV Outlook 2022

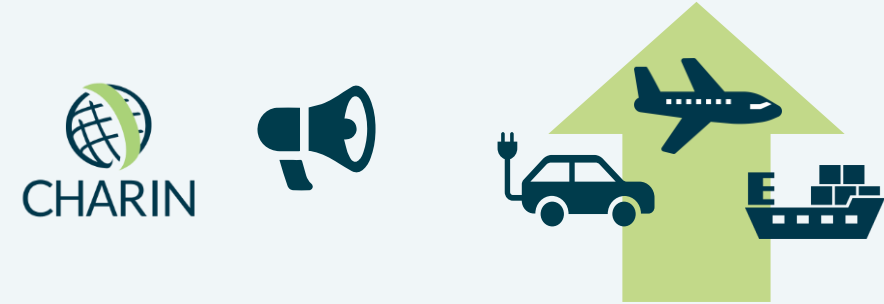
CharIN's Vision

The overall scope

The Charging Initiative e.V. (CharIN) is a non-profit association promoting **interoperability of global charging solutions** for vehicles of all types, and to define requirements for the **evolution** of charging related standards and for the **certification** of CCS based charging products.



CharIN undertakes **activities in the different world regions** to promote charging of electric vehicles as well as charging in the aviation and marine sector, supporting battery powered mobility, and related technologies.






The alliance strongly promotes the **adoption of charging standards**, including, but not limited to, **CCS, MCS, ISO /IEC 15118** and related standards, together with all measures and services connected therewith.

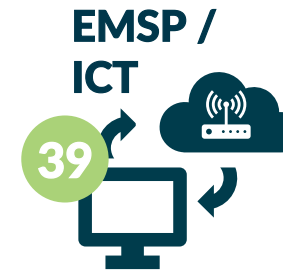
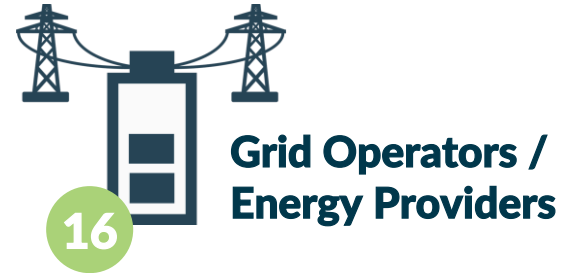


CharIN's Value Chain

As of January 1st, 2023

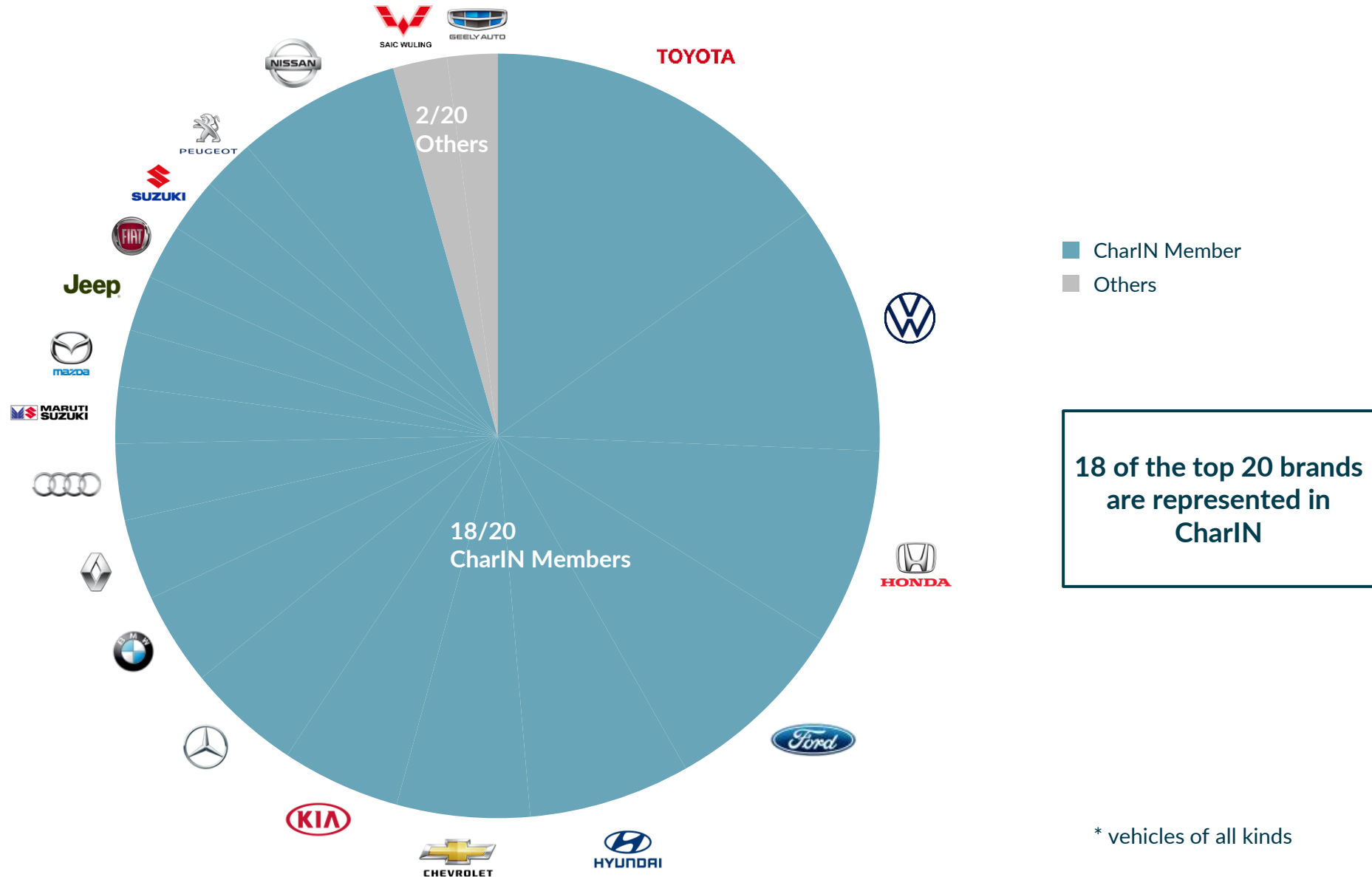
- 164 Core Members
- 135 Regular Members
- 2 Associated Members

- 184  Europe
- 64  Asia / Australia
- 52  North America



Membership Share

Top 20 brands 2020 by volume*



* vehicles of all kinds

NEWS

Ford & GM switching to Tesla NACS EV chargers in North America

The landmark move will see the first non-Tesla car manufacturer integrate with its Supercharging network

9 JUN 2023, 10:39 AM

Comment

Share

TechCrunch+ Market Analysis

GM and Ford could help spark a charging standards war by teaming up with Tesla

Rebecca Bellan @rebeccabellan / 6:00 AM GMT+12 • June 10, 2023

Charging System Standards worldwide

Advantages of ISO 15118 Communication Protocol

Charging System	Communication Protocol	DC	AC	TLS	PnC	SCF	BiDi	WPT	ACD
CCS 1 CCS 2 MCS (Global)	ISO 15118-20 Ed1 (Q1 2022)	✓	✓	✓	✓	✓	✓	✓	✓
	ISO 15118-2:2014 Ed. 1	✓	✓	✓	✓	✓	X	X	X
	DIN SPEC 70121:2014 Ed. 2	✓	X	X	X	X	X	X	X
CHAdeMO 3.0 (Japan)	Tbd (ChaoJi-2, CAN 11bit*)	✓	X	X	X	✓	✓	X	X
CHAdeMO (Japan)	IEC 61851-23/24 (CAN 11bit*)	✓	X	X	X	X	✓	X	X
ChaoJi (China)	Tbd (ChaoJi -1, CAN 29bit*)	✓	X	X	X	✓	?	X	X
GB/T (China)	GB/T 27930 (CAN 29bit*)	✓	X	X	X	X	X	X	X

AC – Alternating current charging

ACD – Automatic connection device

BiDi – Bidirectional charging

DC – Direct current charging

*Limited bandwidth due to
CAN bus based physical layer

PnC – Plug & Charge

SCF – Smart charging function

TLS – Transport Layer Security

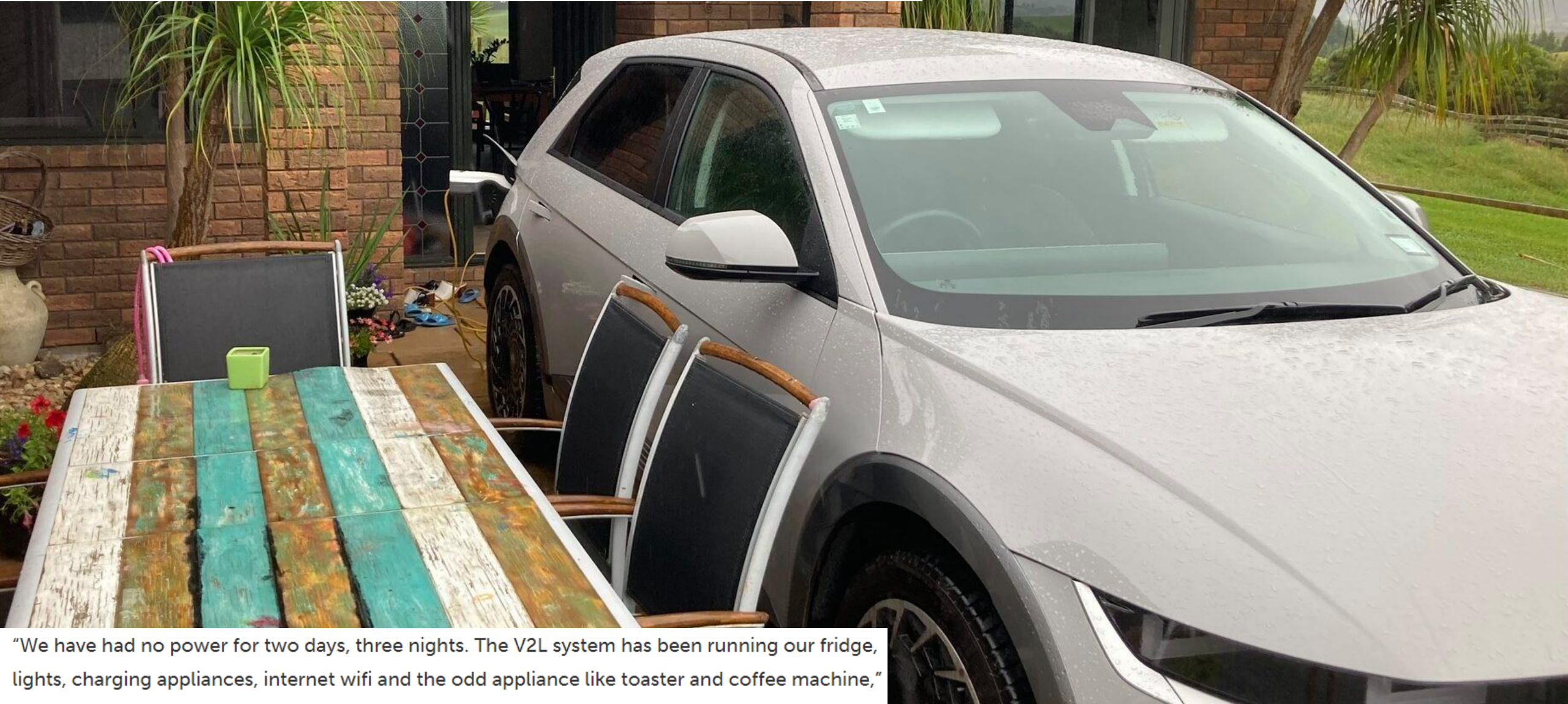
WPT – Wireless Power Transfer



ISO 15118-20 Ed. 1 adds additional features and charging methods

For the first time, implementation of ISO 15118-20 Ed. 1 will serve all use cases to enable seamless introduction of electric vehicles.

EVs being used to power homes following cyclone

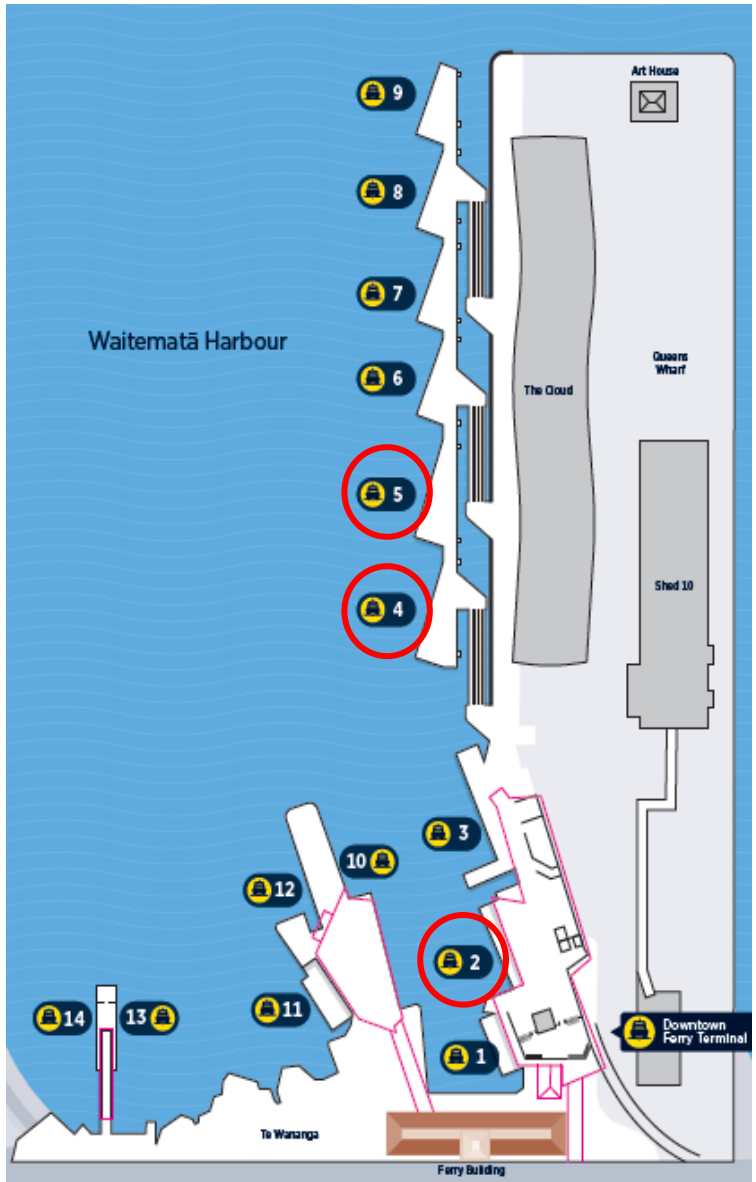
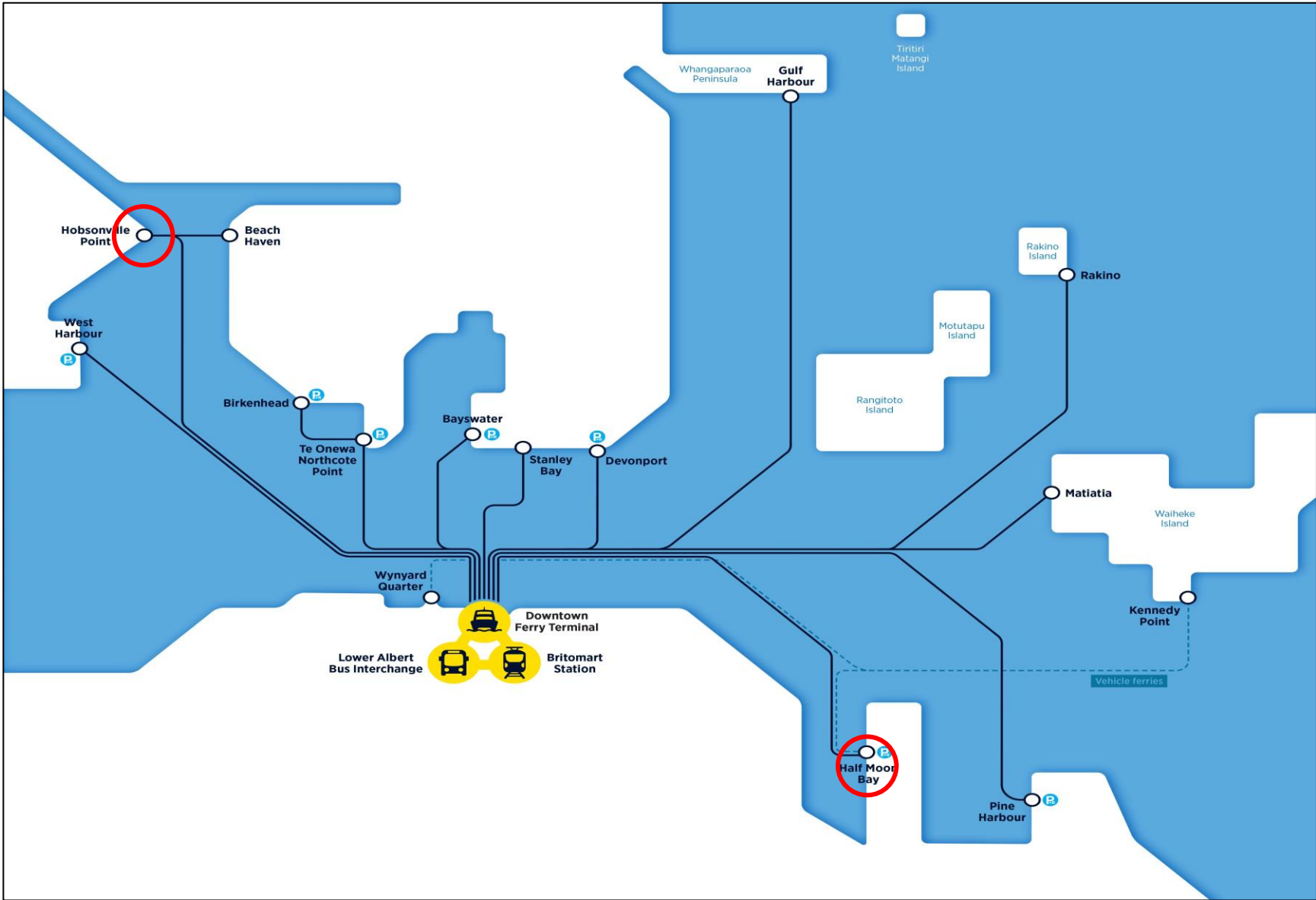


"We have had no power for two days, three nights. The V2L system has been running our fridge, lights, charging appliances, internet wifi and the odd appliance like toaster and coffee machine,"

<https://www.autocar.co.nz/evs-being-used-to-power-homes-following-cyclone/>

《retyna》



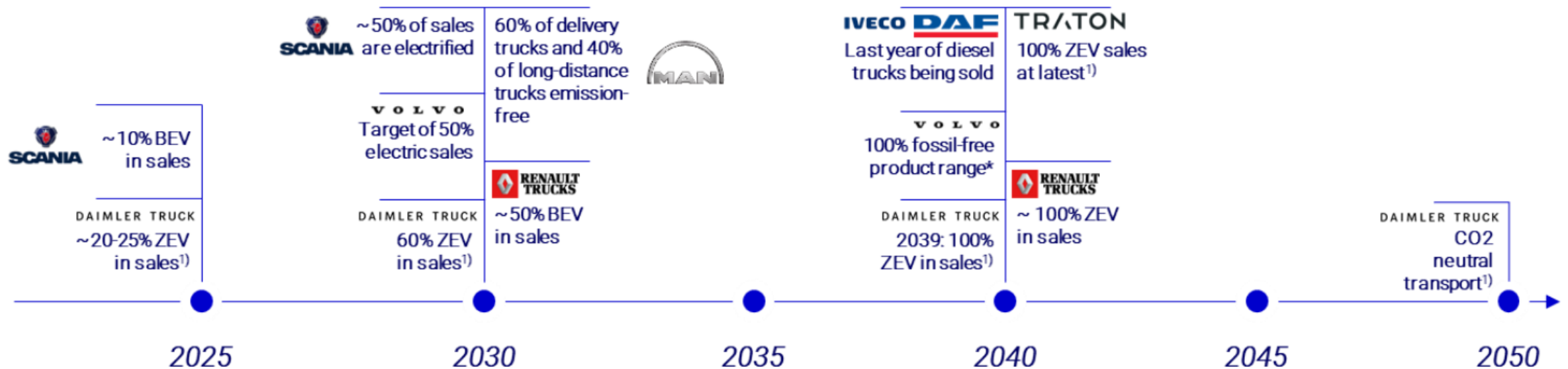




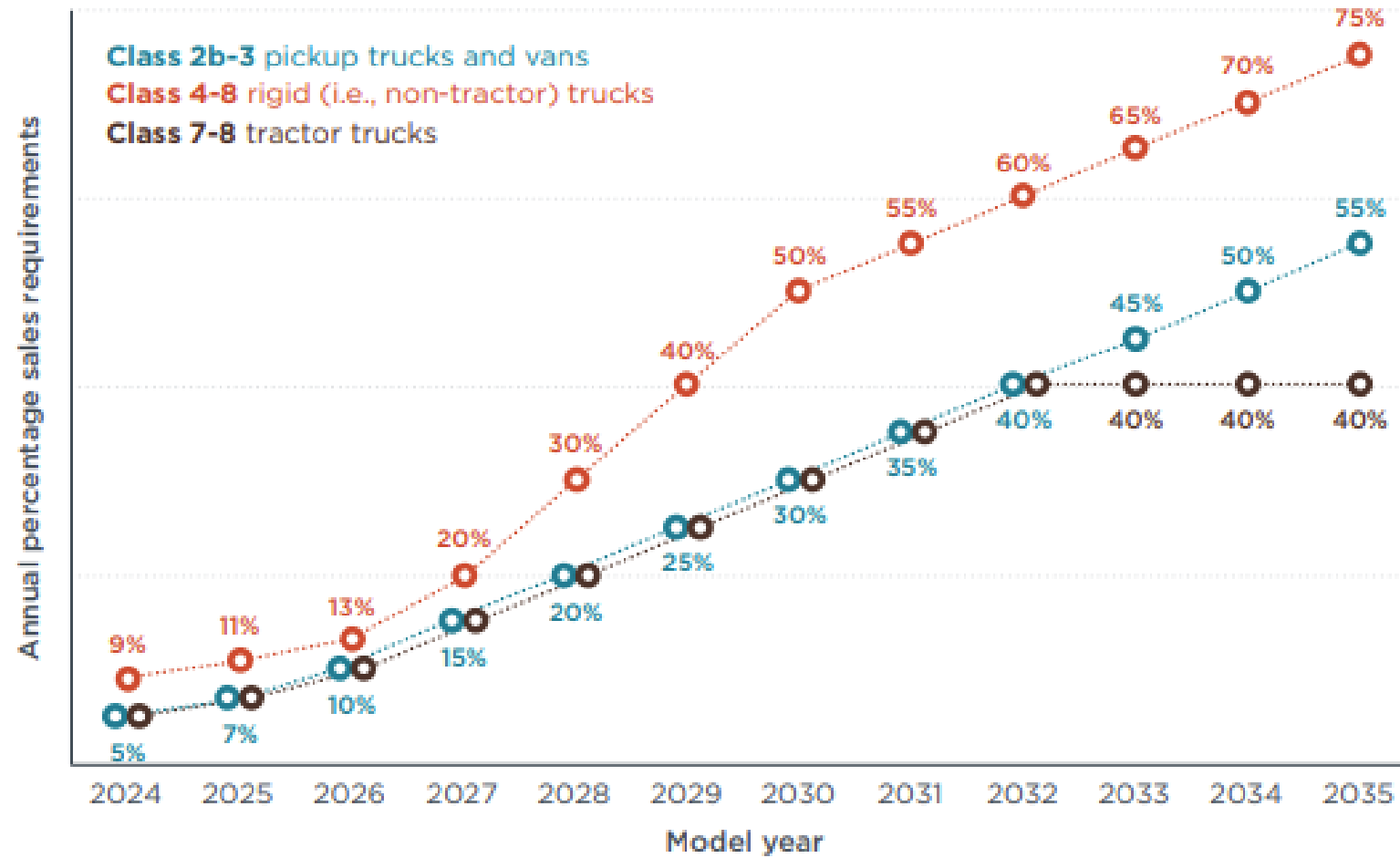




Electrification roadmap of European truck OEMs




California zero emission truck sales mandate



11 vehicles found

Sort by Name A to Z ↓

BYD Motors

BYD 8TT Battery Electric Truck 435 kWh Battery Electric Class 8

Incentive Amount

\$120,000Type **New**

Freightliner

Freightliner eCascadia Battery Electric Truck 475 kWh Battery Electric Class 8

Incentive Amount

\$120,000Type **New****Hyundai XCIENT Fuel Cell Electric Truck** Hydrogen Fuel Cell Class 8

Incentive Amount

\$240,000Type **New**

Global MOU on ZE-MHDV



- » New Zealand joined in December 2021
- » 30% of sales of new Medium- and Heavy-Duty Vehicles (MHDVs) are Zero Emission (ZE) by 2030
- » 100% ZE sales by 2040





Getting wheels turning faster on low-emission heavy vehicles like trucks and buses

“We’re also announcing a fund to provide grants towards the purchase of low emissions heavy vehicles, including trucks, heavy vans and non-public transport buses.

“Estimates show this will help get about 500 low emission heavy vehicles on to New Zealand’s roads, displacing fossil fuel ones. This transition could reduce operators’ fuel costs by up to 75 percent,” Megan Woods said.

\$30 million over three years has been set aside for clean heavy vehicle grants.

Megawatt Charging System

MCS Applications - Mining



Challenges

- **External conditions** for mining operations: size, dust, vibration, extreme temperatures and impacts
- **Robust connection requirements** for medium to high powered equipment in extreme environments such as mining (approx. 3-9 MW)
- Development of an even more powerful connector to ensure that the systems can be used without too much downtime and massive battery sizes (approx. 9-15 MW)



Goal

- Contribute to the development of **interoperable charging solutions** within a robust global mining environment, adoption and adaption
- Development of new, **more powerful cable plug and dynamic charging interface box** for mining by adopting ISO 15118



Next Steps

- Founding of a **CharIN Task Force**: CharIN provides a global, cross-industry platform



Taskforce Founders

ABB

BHP



RioTinto



Teck





A lens on renewable energy for transport

Elizabeth Yeaman

Liz@retyna.co.nz

027 445 0279

www.retyna.co.nz



Trucks: direct electrification most efficient by far

