S&P Global
Mobility

Automotive Trends Impacting the Aftermarket:

Navigating Opportunities presented by an ever-changing vehicle fleet

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November 2022

aapex
ahead of the curve

Update on current status

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The vehicle fleet bounced back in 2021, and 2022 continues to be positive

283M ▲

Passenger Cars and Light Truck
January 2022

S&P Global Mobility VIO January 2022

New vehicle sales continue to be muted by supply chain constraints

283M

Passenger Cars and Light Trucks
January 2022

15.1M ▼

New vehicles added
January 2022

S&P Global Mobility VIO January 2022

Vehicles persist in the fleet as used vehicle values continue to be high

283M

Passenger Cars and Light Trucks
January 2022

15.1M

New vehicles added
January 2022

4.2% ▼

Scrappage
January 2022

S&P Global Mobility VIO January 2022

Average age continues its climb and current indicators points to growth next year

283M

Passenger Cars and Light Trucks
January 2022

15.1M

New vehicles added
January 2022

4.2%

Scrappage
January 2022

12.2 ▲

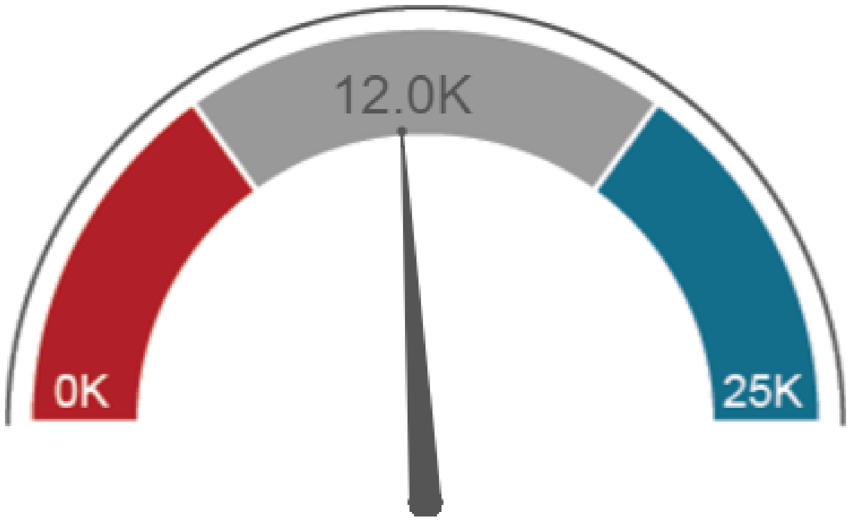
Average vehicle age
January 2022

S&P Global Mobility VIO January 2022

Global miles traveled is growing although the fleet grew marginally faster in 2022

Global Mileage and Odometer Index

Global



Lifetime Odometer Estimate YTD

1 2 0 4 7 5 k m

Total Kilometers Driven Annually

2021	2022	Difference
11.9 Trillion Kilometers	12.2 Trillion Kilometers	+2.29%

Estimated Current Annual Mileage per Vehicle

2021	2022	Difference
12.1 Thousand Kilometers	12.0 Thousand Kilometers	-0.29%

S&P Global Mobility 2022 VMT – Estimates based on modeling from nearly 1B vehicles across 21 markets

Vehicle miles traveled and Odometer Estimates are very different regionally

Post pandemic behavioral changes are adding further regional nuance

Americas

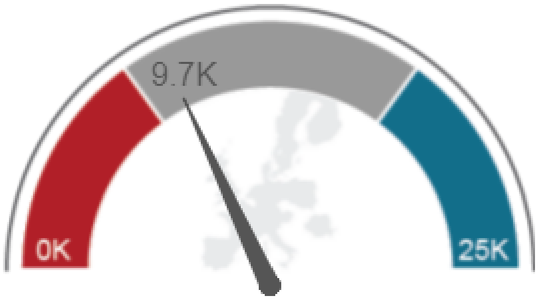
AMER Estimated Current Annual Mileage

Lifetime Odometer Estimate YTD

1 6 4 6 4 1 k m

EMEA

EMEA Estimated Current Annual Mileage

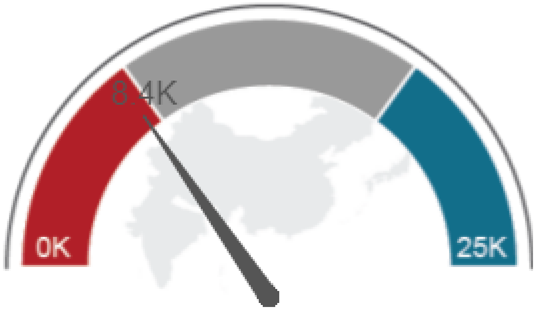


Lifetime Odometer Estimate YTD

1 2 4 7 0 4 k m

APAC

APAC Estimated Current Annual Mileage



Lifetime Odometer Estimate YTD

0 7 4 2 7 2 k m

S&P Global Mobility 2022 VMT

Ongoing soft new vehicle sales

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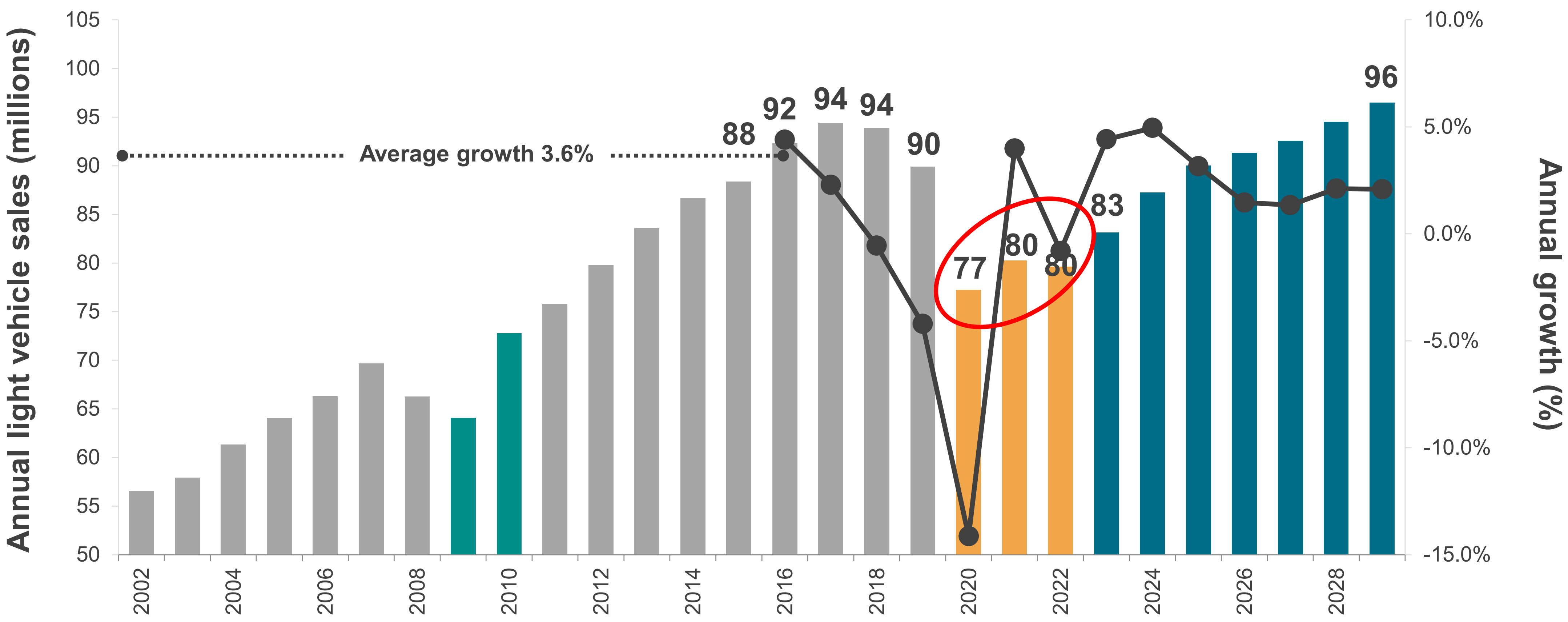
Global Light Vehicle Sales

Russia/Ukraine Conflict and Deteriorating Macro Conditions Alter Recovery Cadence



Source: S&P Global Mobility Light Vehicle Sales Forecasts

Semiconductor Outlook: It's Complicated

Analog Chip Supply will Determine How Many Vehicles will be Built in the Near-Term

Factors Influencing Automotive Chip Supply

Demand

Number of chips per car

- Mix by vehicle segment and by propulsion system
- De-contenting for non-essential features

Mis-match of production and demand

- "Toilet paper effect". Inflation of demand by OEMs and suppliers
- Inventory
- Mix of chips ordered in advance not matching real need

How many vehicles will the fab capacity support in 2022, 2023 and beyond…?

Supply

Total capacity for chip fabrication

- CAPEX
- Miniaturization of chips (e.g. migration to smaller nodes)
- Short term stretched capacity (hot lots, postponing maintenance, manual lots…)

Allocation of chip fabrication capacity to automotive

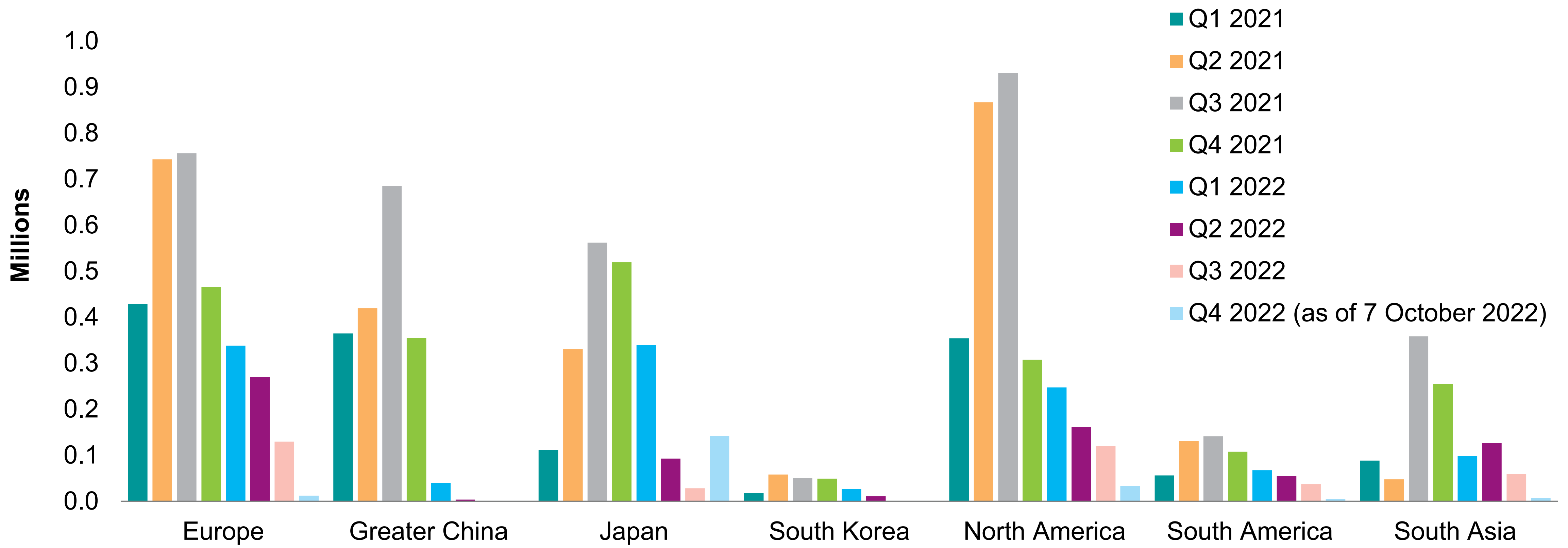
- Demand from other markets especially mobile phones, consumer electronics, industrial, servers…
- Priority given by chip suppliers to automotive versus Apple, other phone suppliers…
- Political pressure

Source: S&P Global Mobility

Global Production Overview: Peak Disruption has Passed by Shortages Remain

Output in Mainland China and India is Well Insulated from Ongoing Shortages, but Mature Regions Continue to Underperform

Light Vehicle Production Volume Losses to Date Due to Chip Shortage



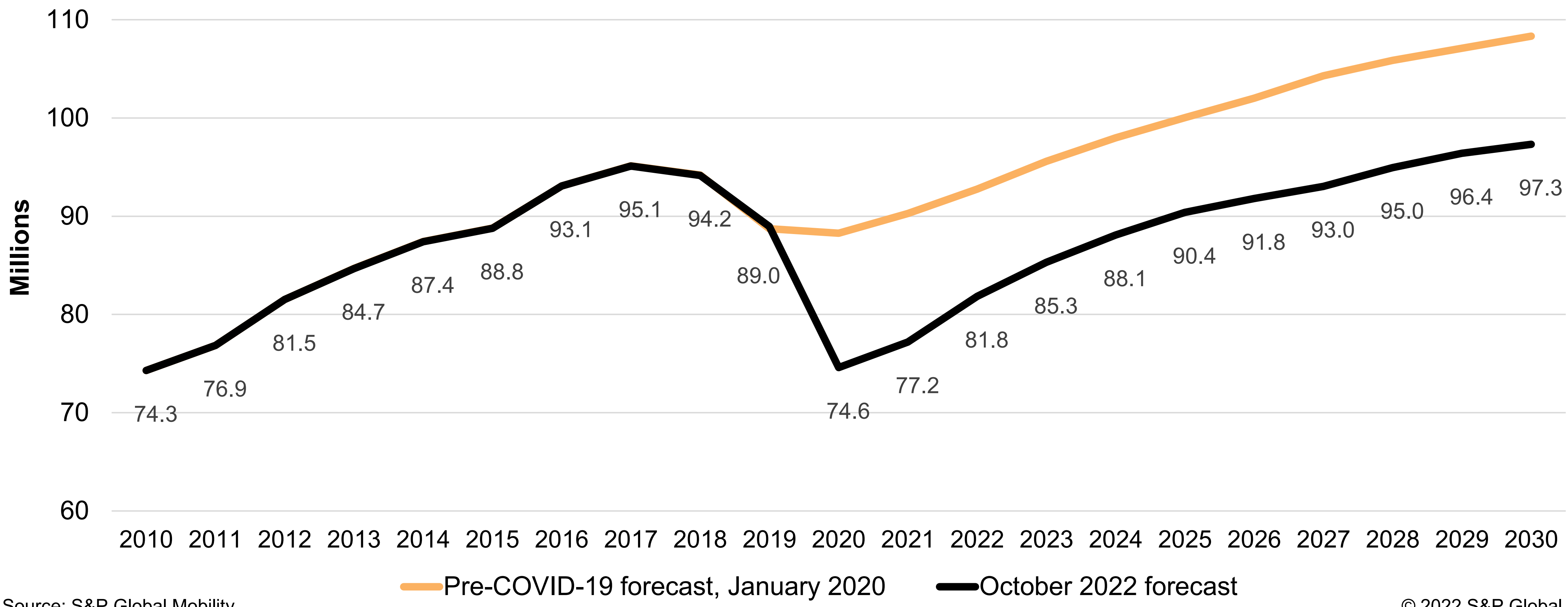
Note: This is not forecast, the figures represent the scale of disruption identified as of 9 September 2022.

Source: S&P Global Mobility

Global Light Vehicle Production Overview

With Nearly 38 Million Units Cut from the Forecast in the Period to End 2022, What Could the Recovery Look Like?

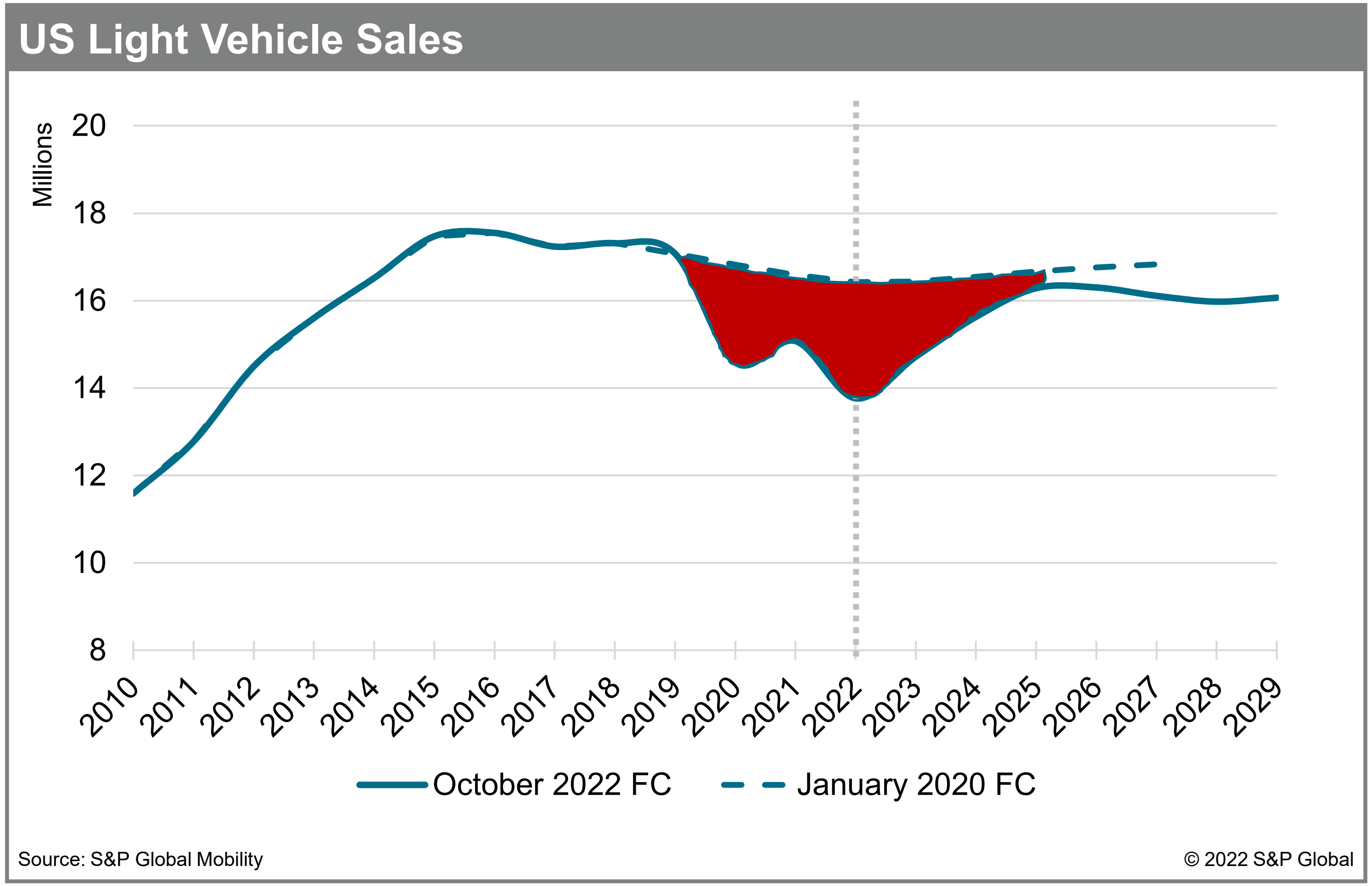
Global Light Vehicle Production Forecast



Source: S&P Global Mobility

Supply Chain Constraints Alter Sales Recovery

Pent-up Demand is Vulnerable to Macroeconomic Deterioration leading to Demand Destruction



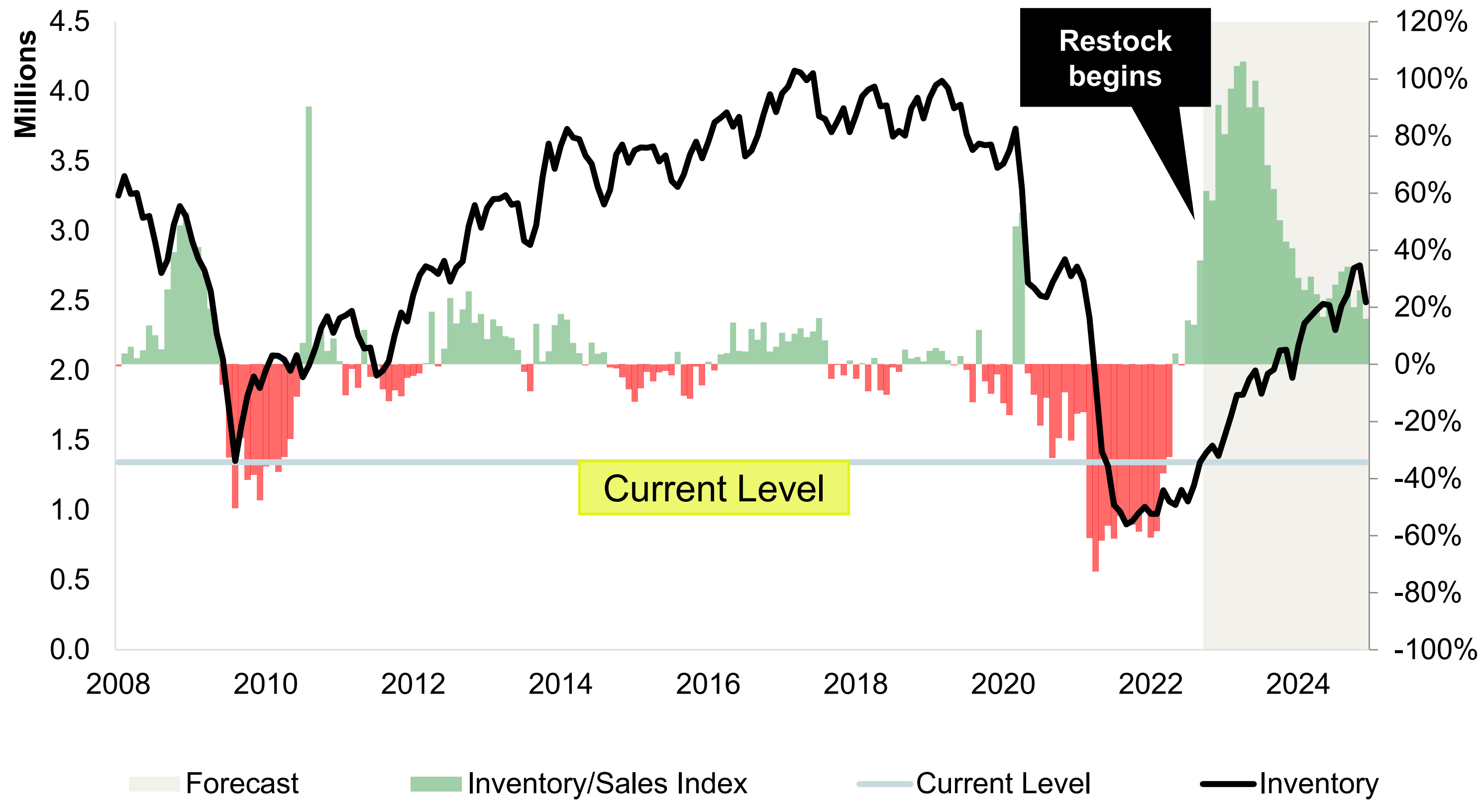
Economic issues

- Consumer outlook stressed by inflation, vehicle prices and material concerns
- Currently dealing with supply constraints, **but transition to demand constrained is likely**
- Opportunities to find right customer based on vehicle age and scrappage
- Market conditions are shifting, yet we are already running at recessionary levels
  - Interest rates move higher
  - Affordability to become a challenge; macro environment weighs on sentiment

US Vehicle Inventory Levels

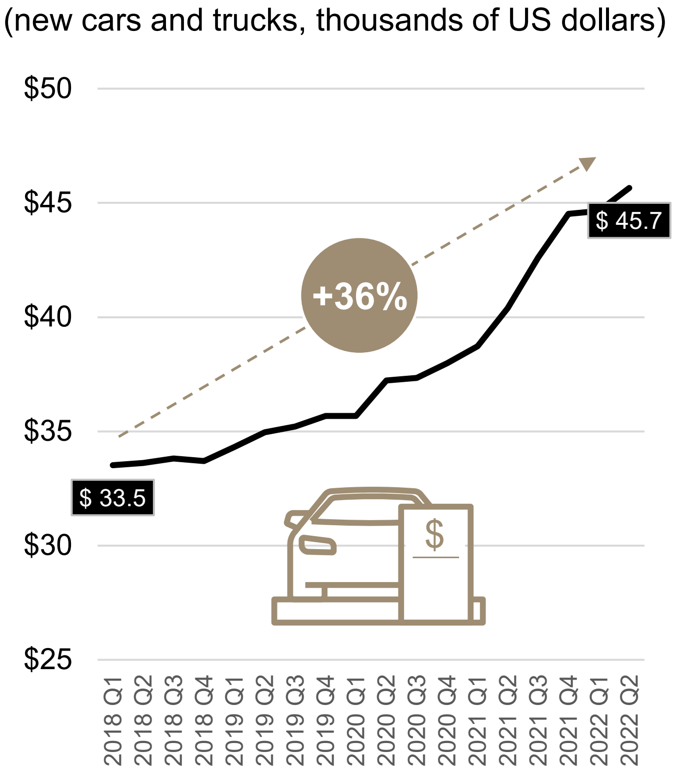
Supply Chain challenges extend Inventory Constraints, sales at Recessionary Levels, and macro pressures contribute to Demand Destruction

US Vehicle Inventory by Month



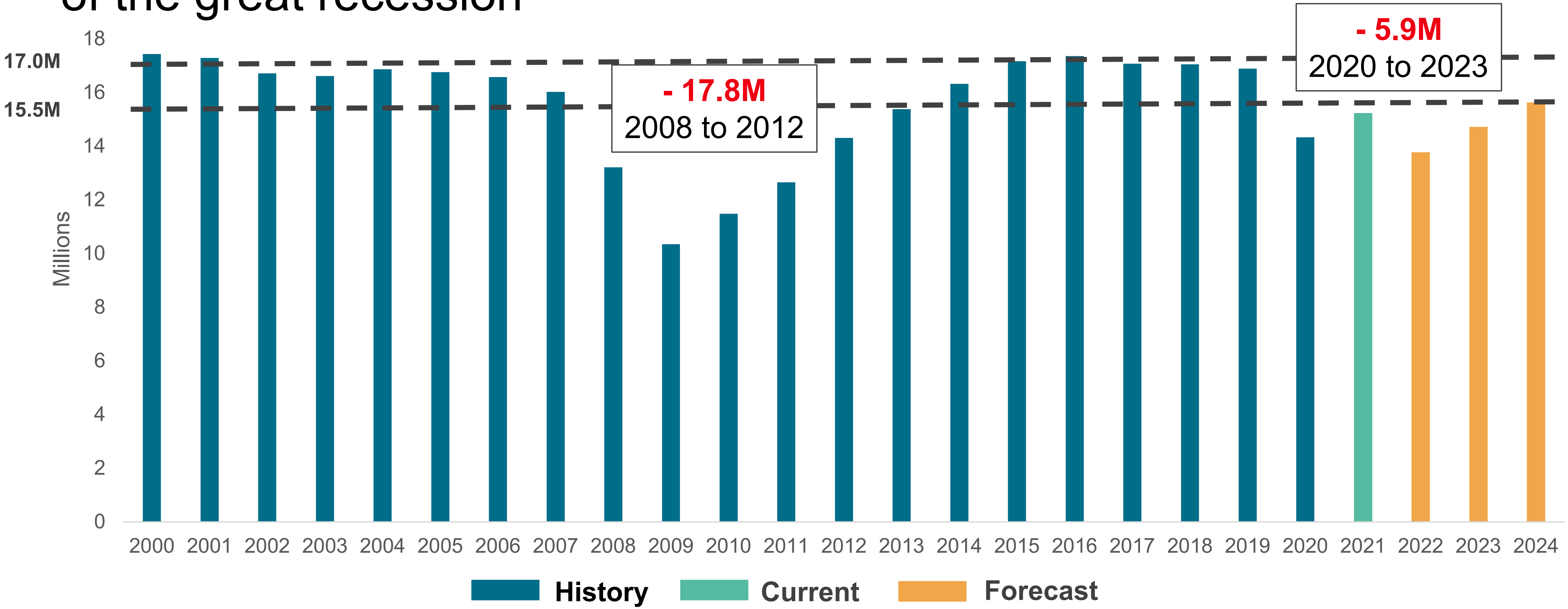
Source: S&P Global Mobility Light Vehicle Production Forecast; Motor Intelligence

US Avg. Light Vehicle Prices



Source: S&P Global Mobility; Market Intelligence (former IHS Markit ECR)

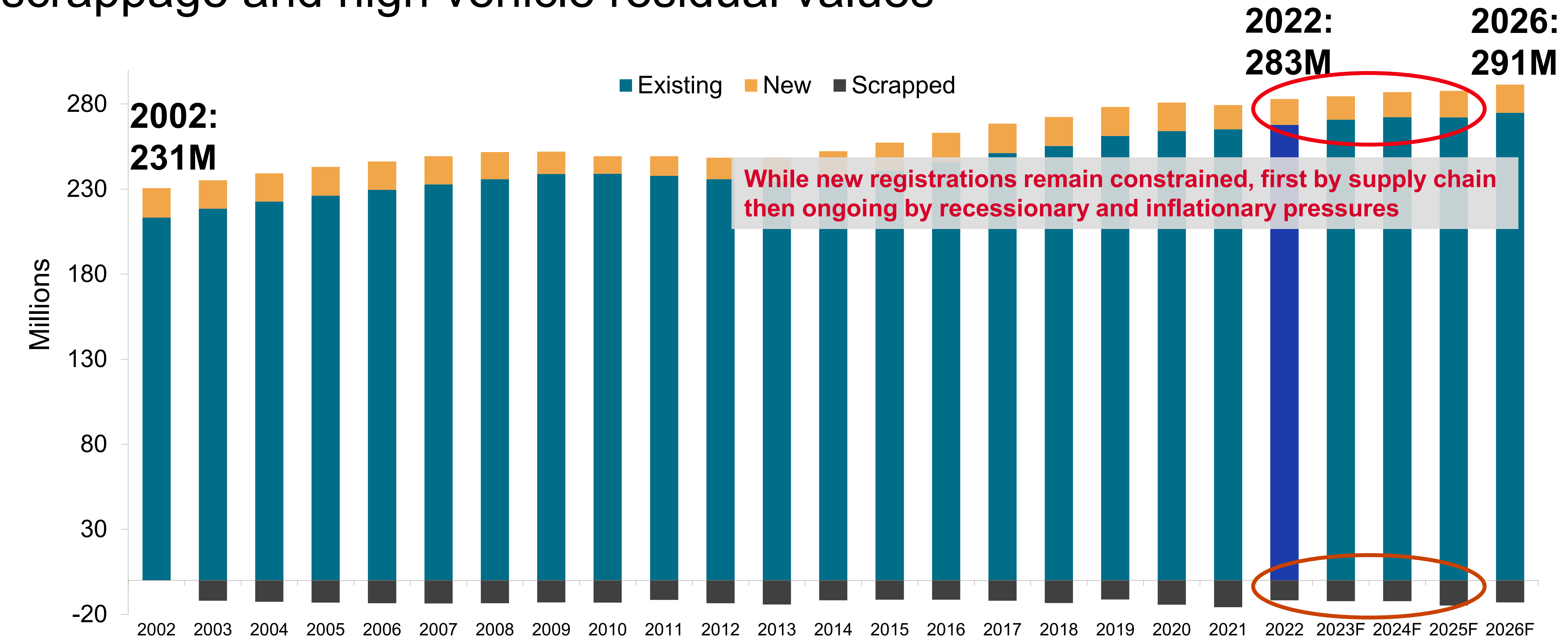
Overall loss of new registrations expected to be about a third of the great recession



Annual New Registrations
Source: S&P Global Mobility

Scrappage hovering near historic lows (US)

VIO growth driven by older vehicles due to low scrappage and high vehicle residual values



Constrained scrappage and vehicles returning will push VIO up

Passenger Cars and Light Trucks Combined
Source: S&P Global Mobility, VIO Dated January 2022

Evolving Vehicle Fleet

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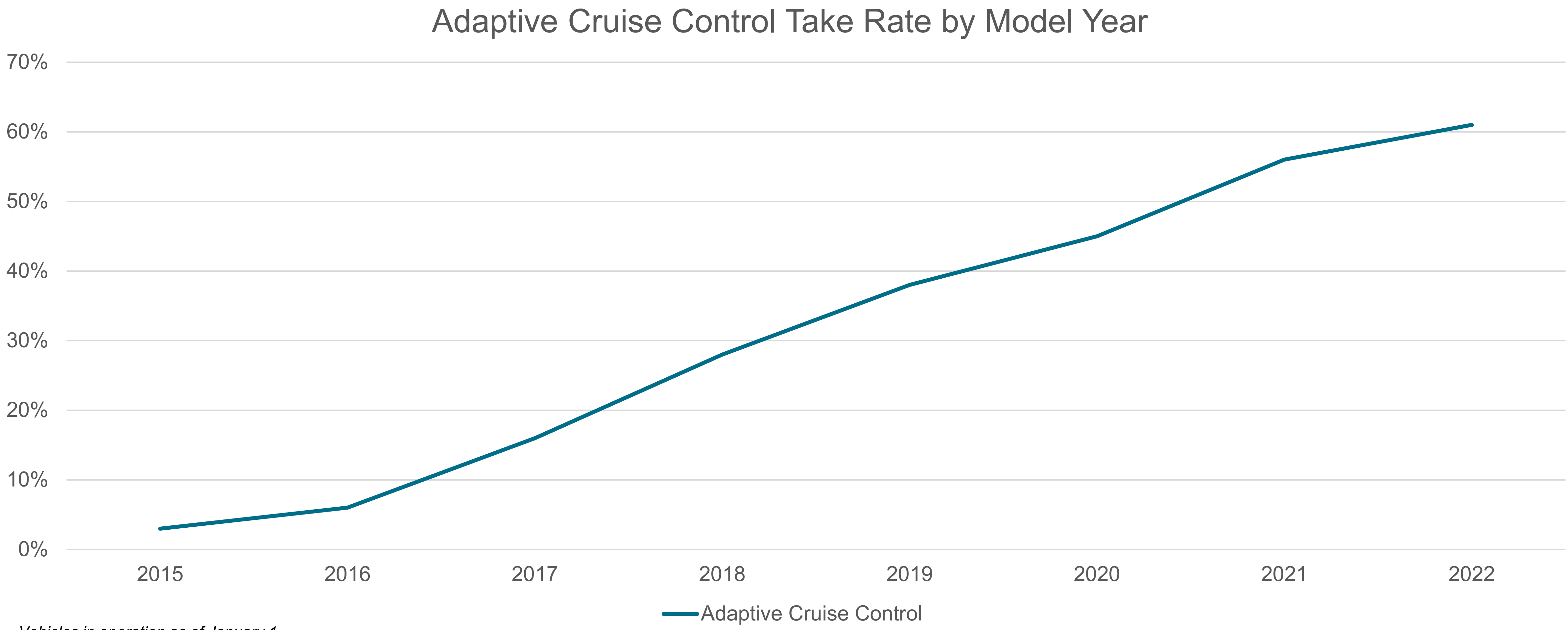
Evolving Vehicle Fleet – ADAS Adoption (US Only)

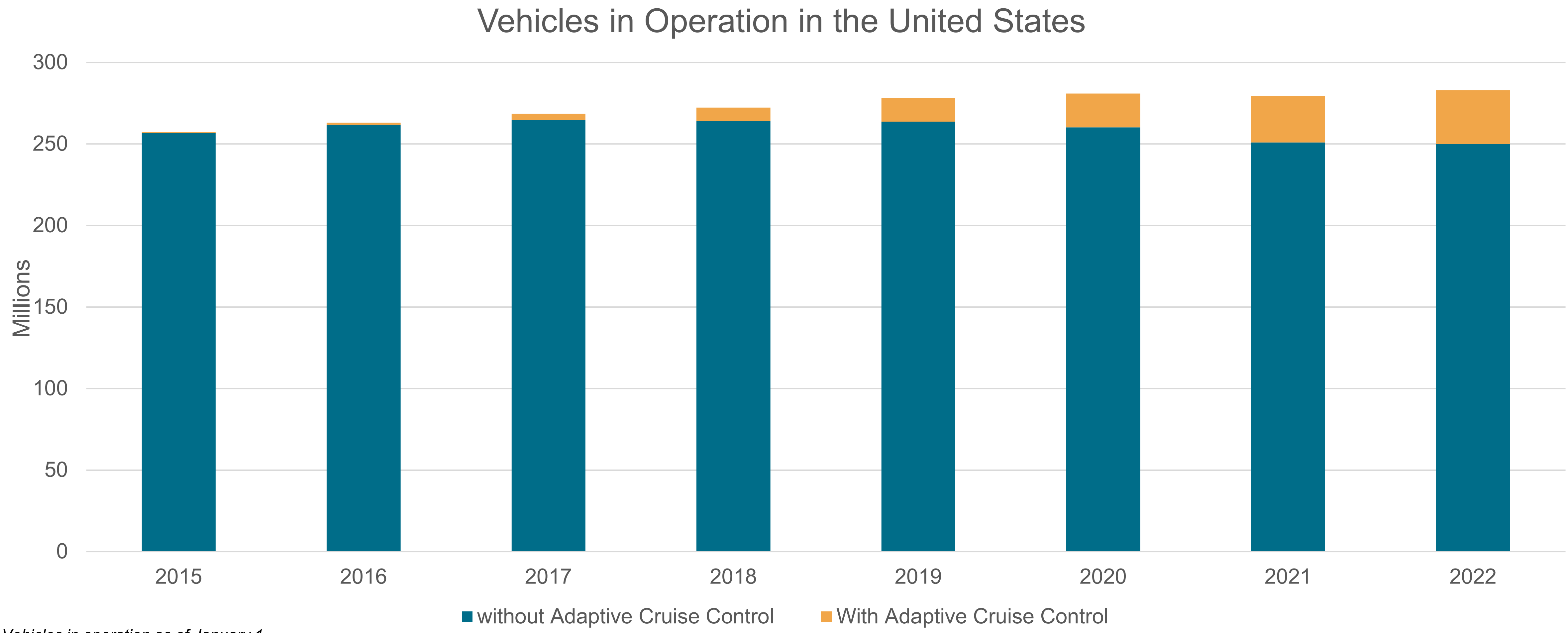
S&P Global Mobility

Adoption of some ADAS features is accelerating and will continue to penetrate the fleet rapidly



Vehicles in operation as of January 1
Source: S&P Global Mobility

Share of VIO takes much longer to show emergence of ADAS technologies



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Source: S&P Global Mobility

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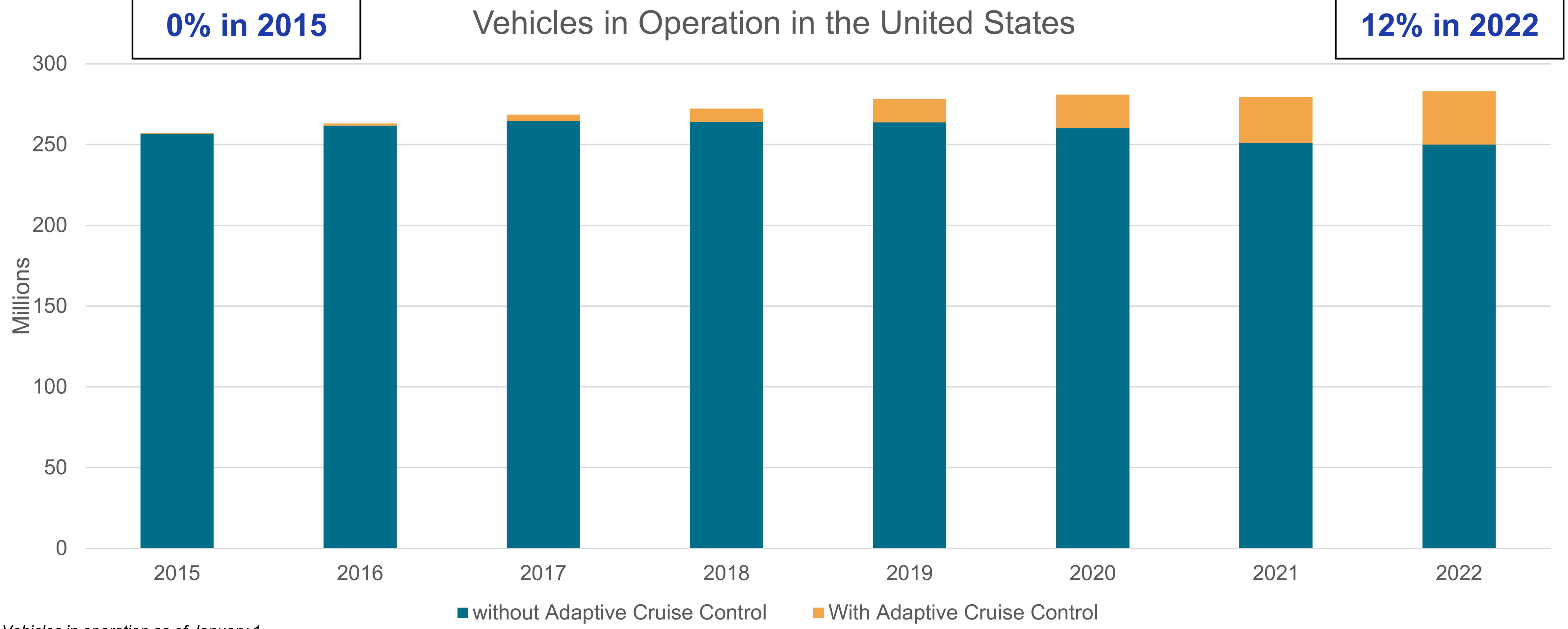
0% in 2015

12% in 2022



Vehicles in operation as of January 1
Source: S&P Global Mobility

Evolving Vehicle Fleet – Connectivity (Global)

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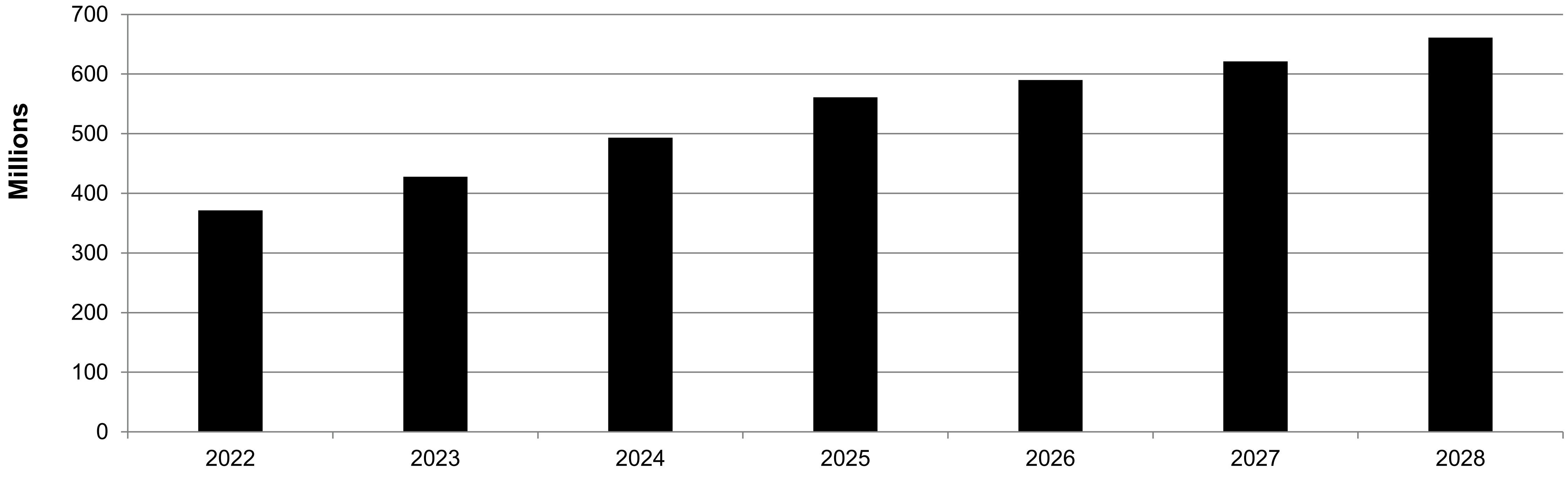
What is the total addressable market for connected vehicle applications?

More new vehicles connected with longer serviceable connections

Connected vehicles in operation (C-VIO), global



Source: S&P Global Mobility, OTA and Telematics forecast, August 2022

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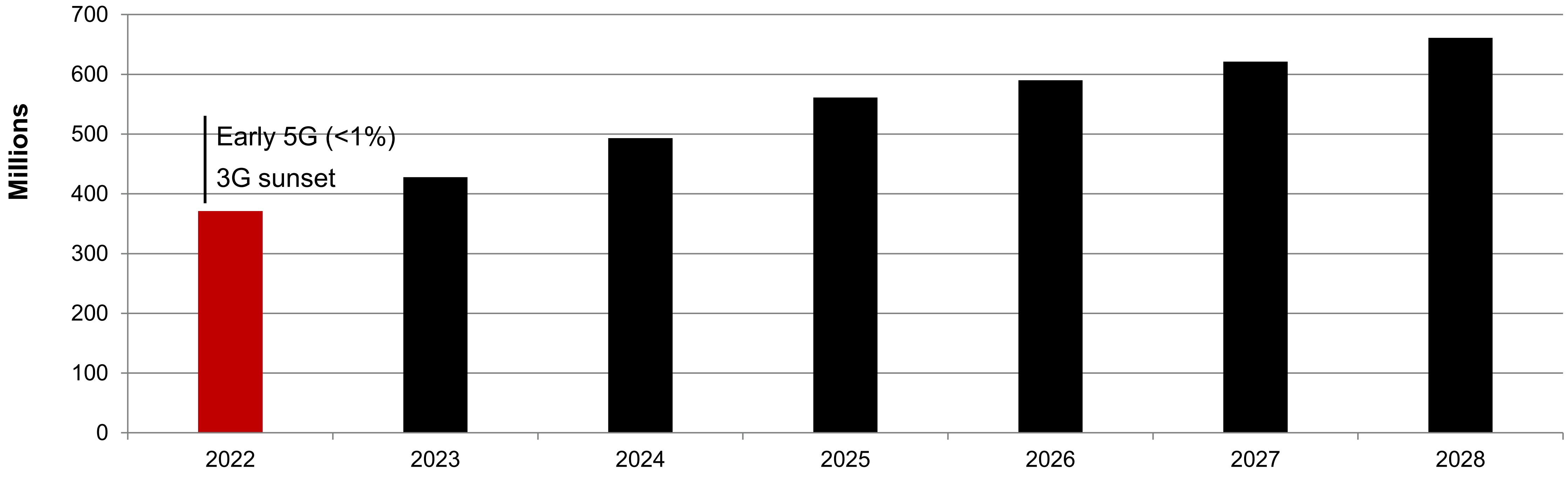

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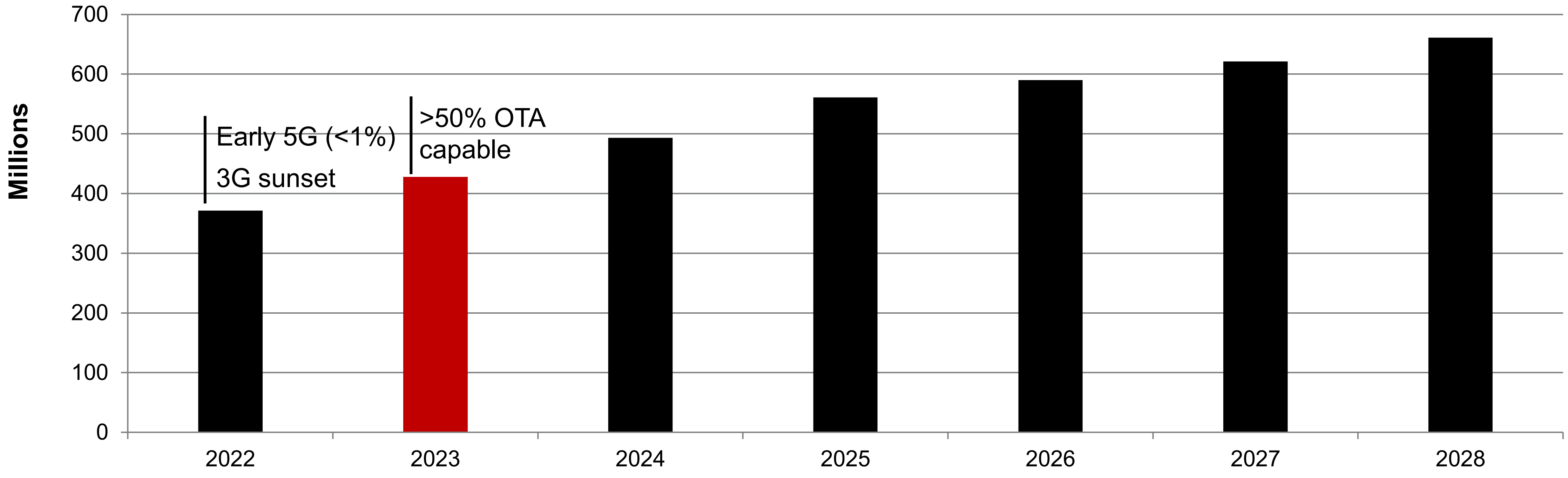

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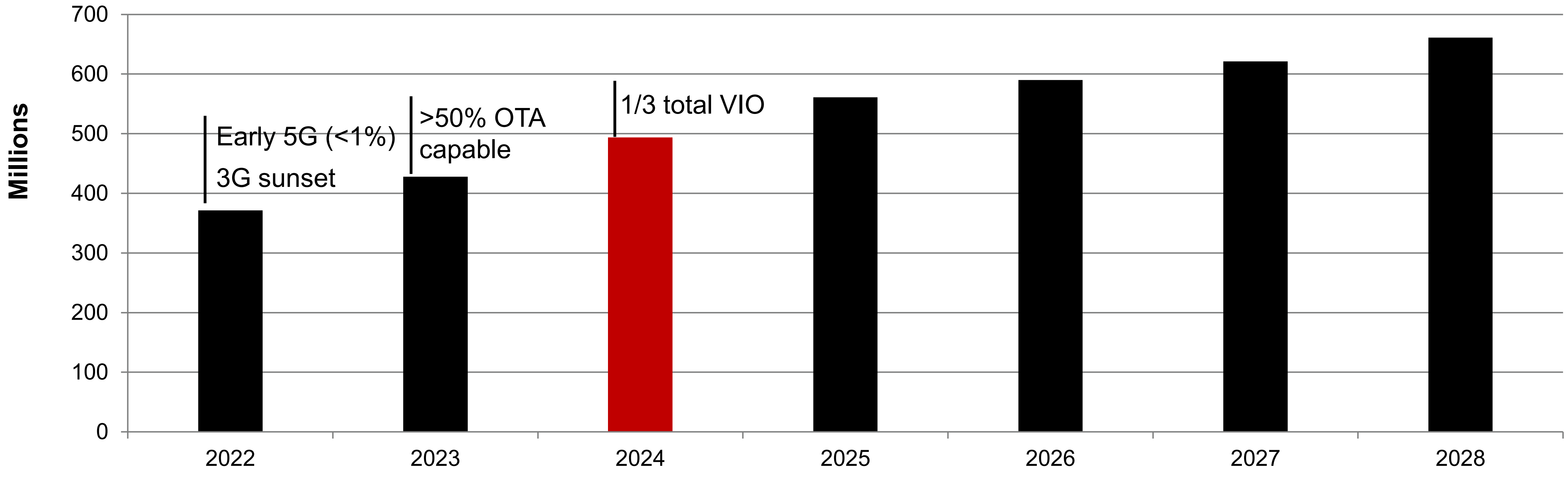

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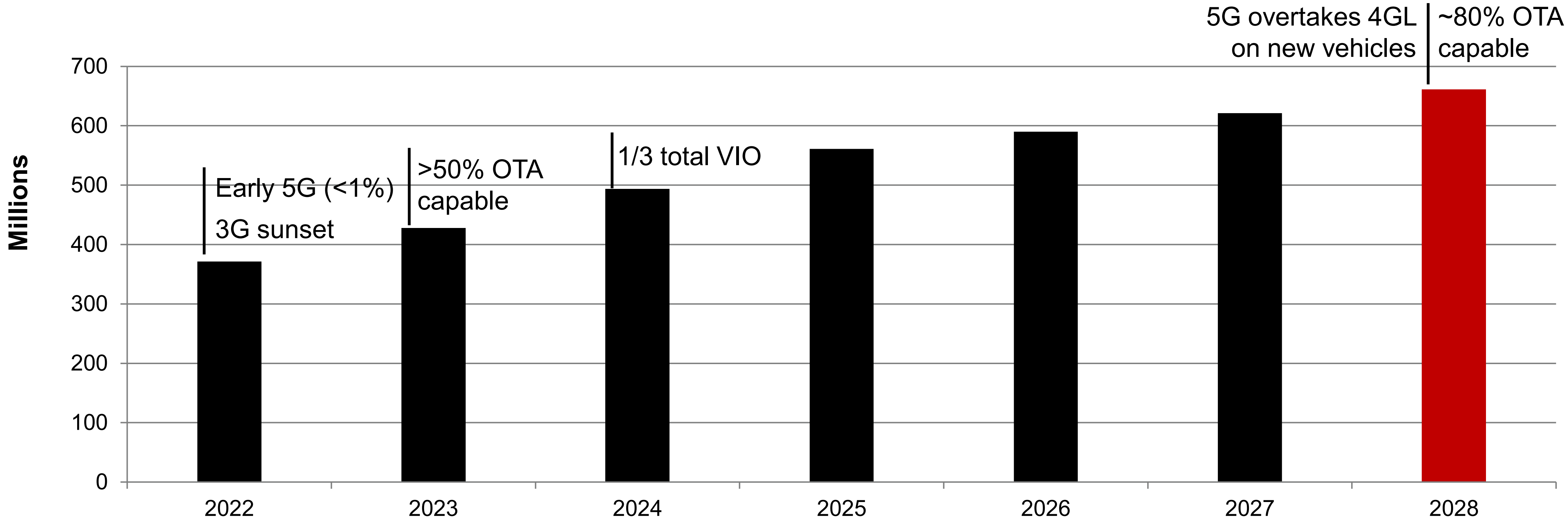

Source: S&P Global Mobility, OTA and Telematics forecast, August 2022

The road to electrification

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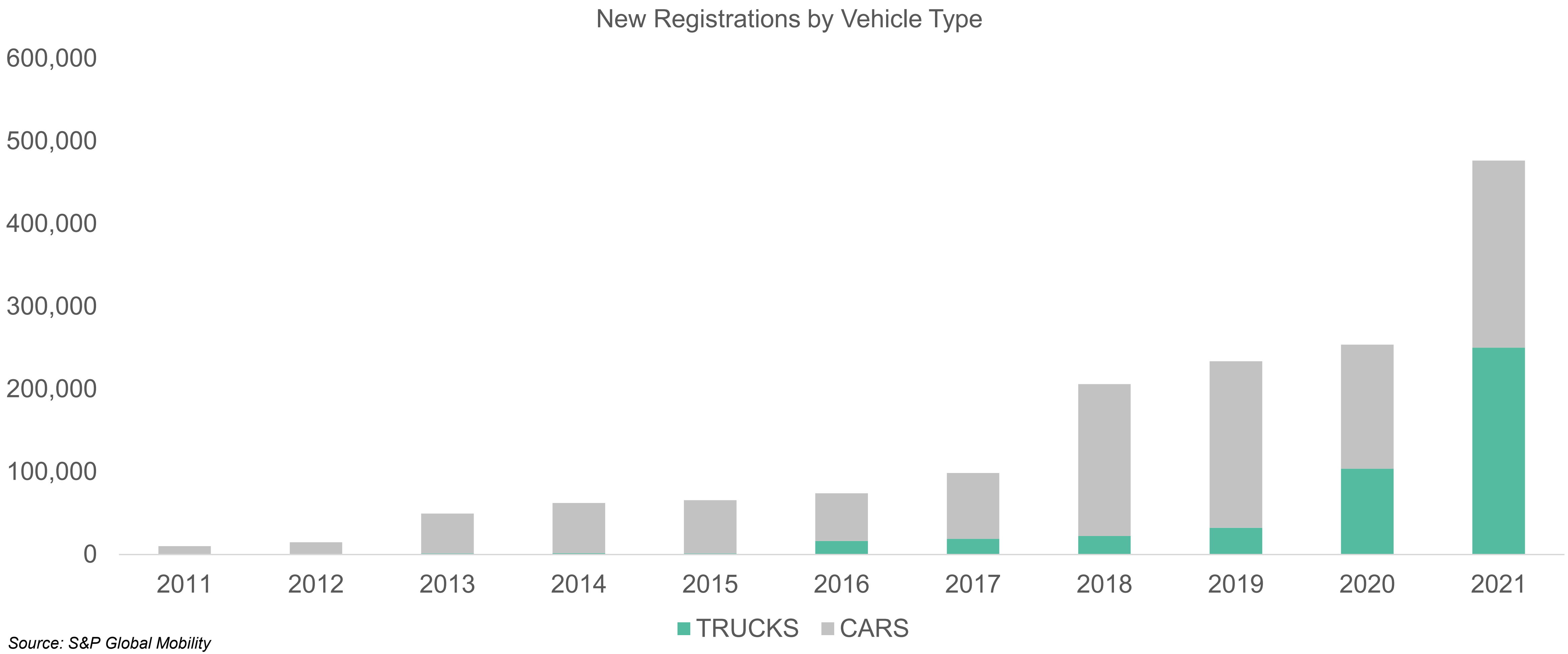
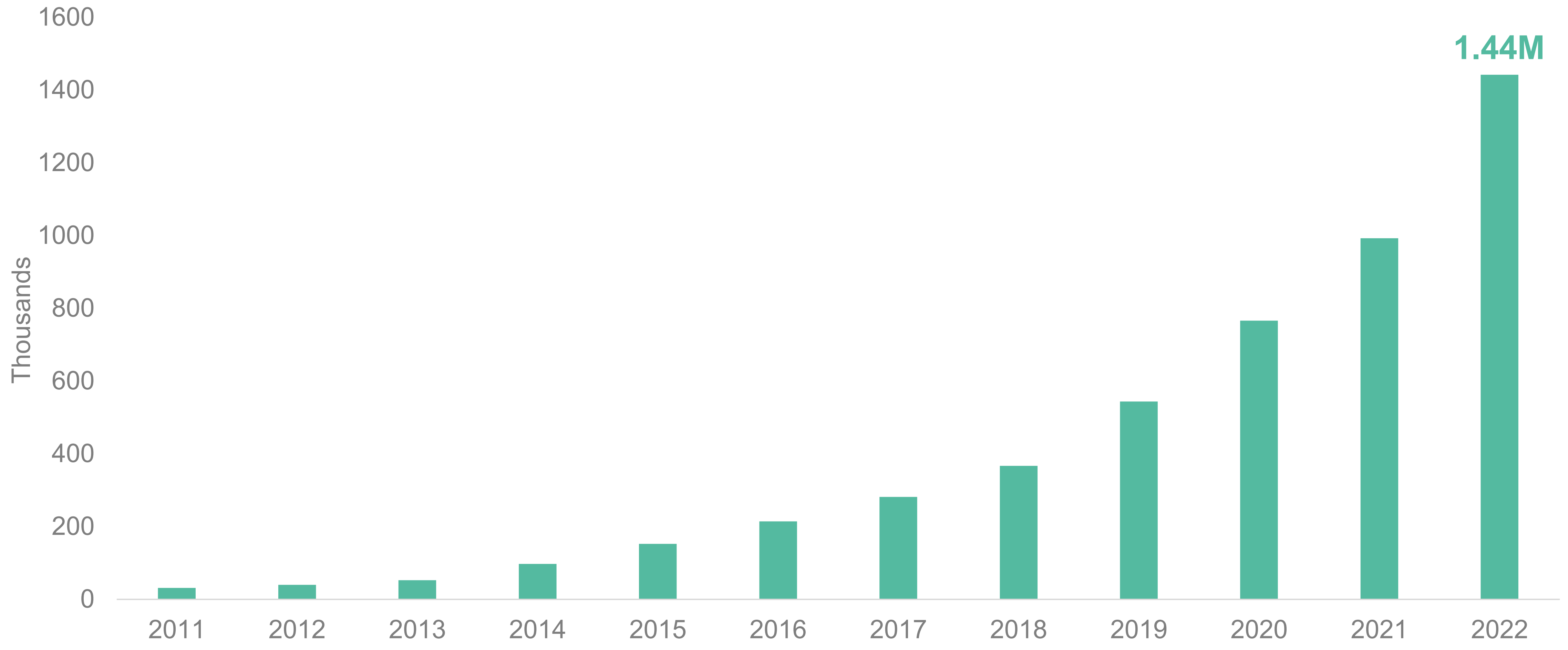
Truck body style EV's boosting registrations



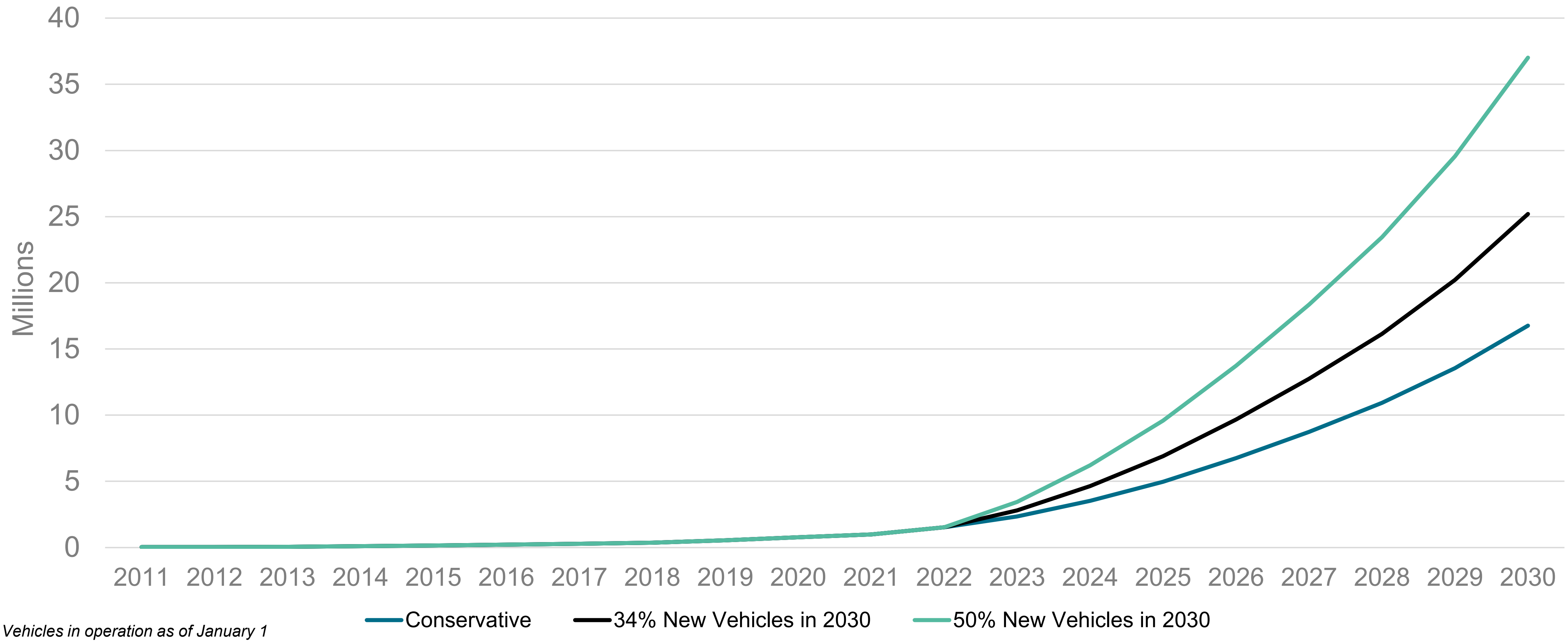
Source: S&P Global Mobility

Volume of Electric Vehicles in Operation is growing too



Vehicles in operation as of January 1
Source: S&P Global Mobility

EV volume in VIO outlook



Vehicles in operation as of January 1
Source: S&P Global Mobility

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The Battery Electric Vehicle (BEV) Landscape is Growing Exponentially

US BEV Market

	2021	2030
Tesla Share of US EV Sales	71%	10%
California Share of US EV Sales	35%	12%
Top 90% **Brands** of US EV volume	Ford, Tesla, Audi, Chevrolet, Nissan, VW	Tesla, Chevrolet, Cadillac, Honda, GMC, Nissan, Volvo, Ford, VW, Lexus, Infiniti, Ram, Jeep, Audi, Toyota, Rivian, Kia, Genesis, Chrysler, Hyundai, Acura, Lucid, Subaru
Models # of EV Models	26	250+
Charging Infrastructure Private, Public, Semi-Public Stations	0.94M	15.3M

Source: S&P Global; 2021 based on Total New Registrations

ZEV/LEV States Map

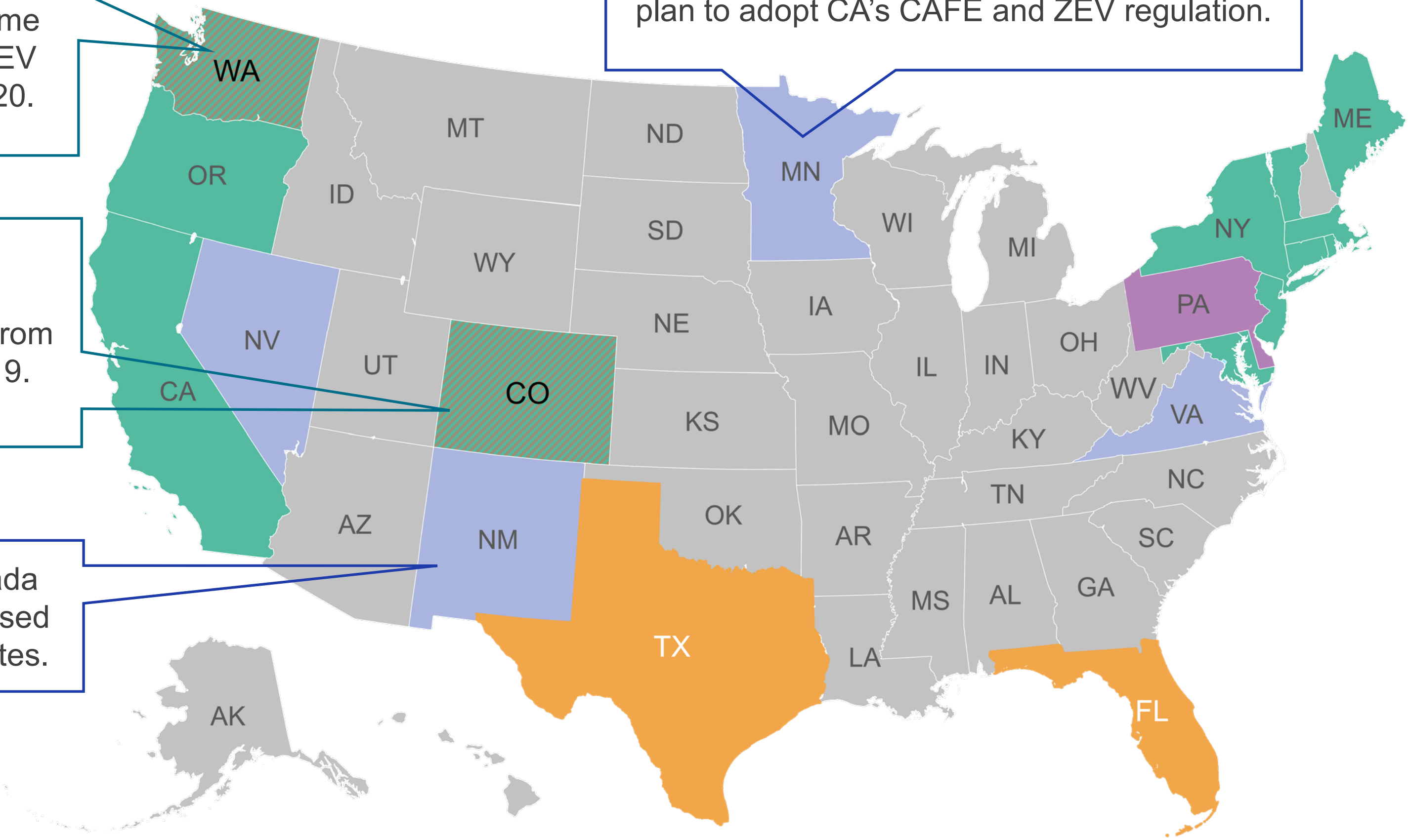
Two Previous LEV states, Colorado and Washington Recently Became ZEV; More Expected to Follow…

Washington became ZEV state from LEV states in April 2020.

Colorado became ZEV state from LEV in August 2019.

New Mexico, Nevada and Virginia are poised to become ZEV states.

In September 2019, Minnesota announced plan to adopt CA's CAFE and ZEV regulation.



ZEV states:

- 32% of total 2021 US registrations
- 58% of total 2021 US EV registrations

Florida and Texas are not ZEV Section 177 states. However, behind CA, they rank 2nd and 3rd nationally for BEV sales.

Powered by Bing
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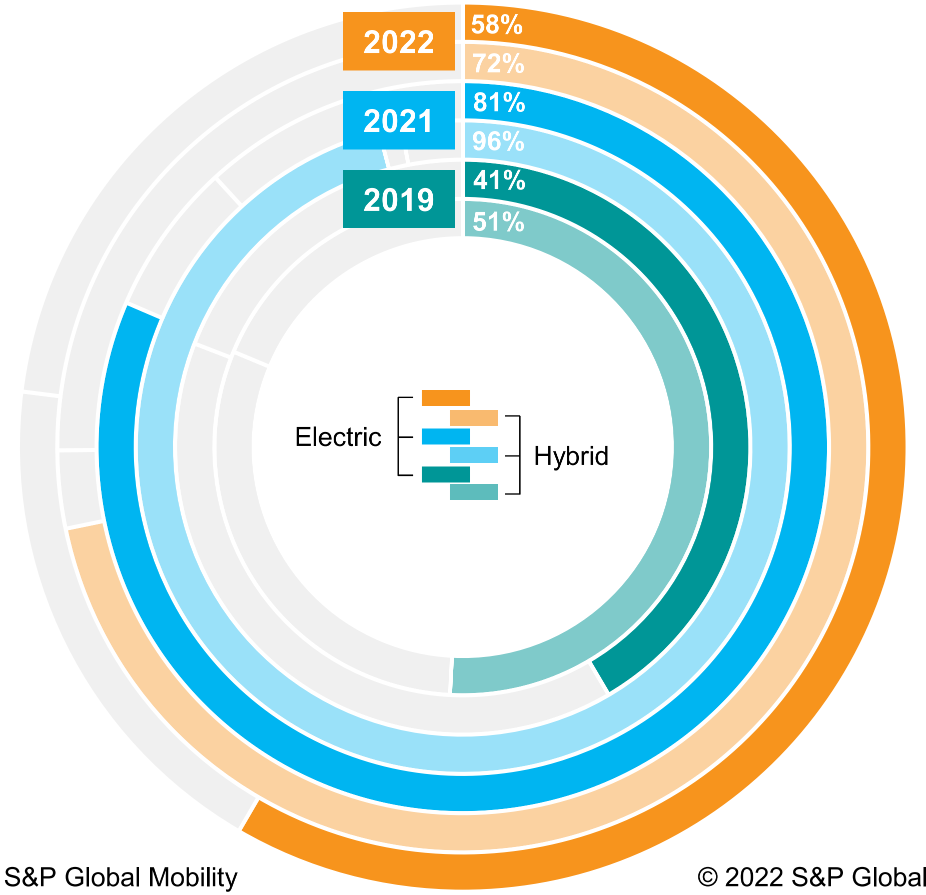
Sources: CARB, S&P Global Mobility research

Consumer openness and buying decisions

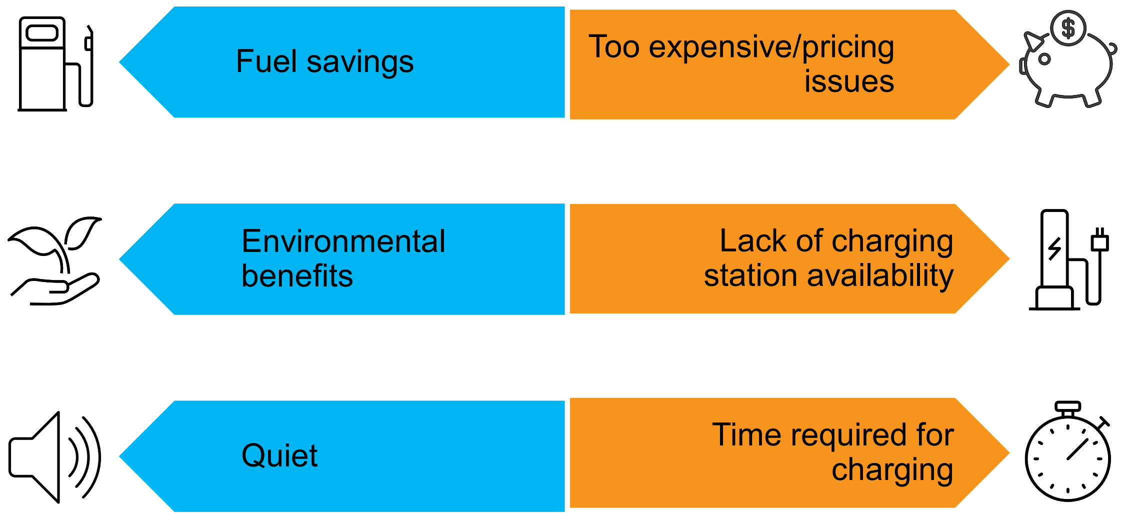
Skepticism toward EV technology has grown as pricing, charging infrastructure, and battery technology remain barriers

Open to purchasing EV/hybrid



Source: S&P Global Mobility

Reasons for and against purchasing an EV/hybrid

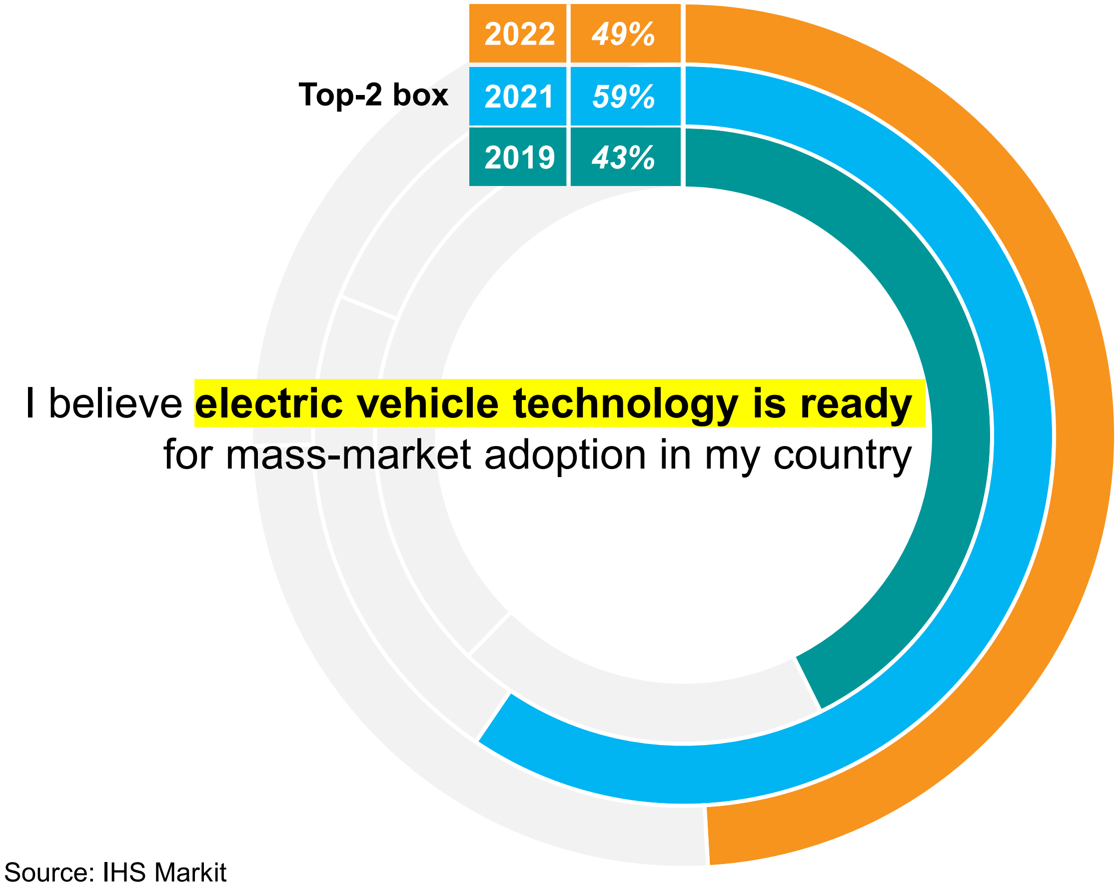


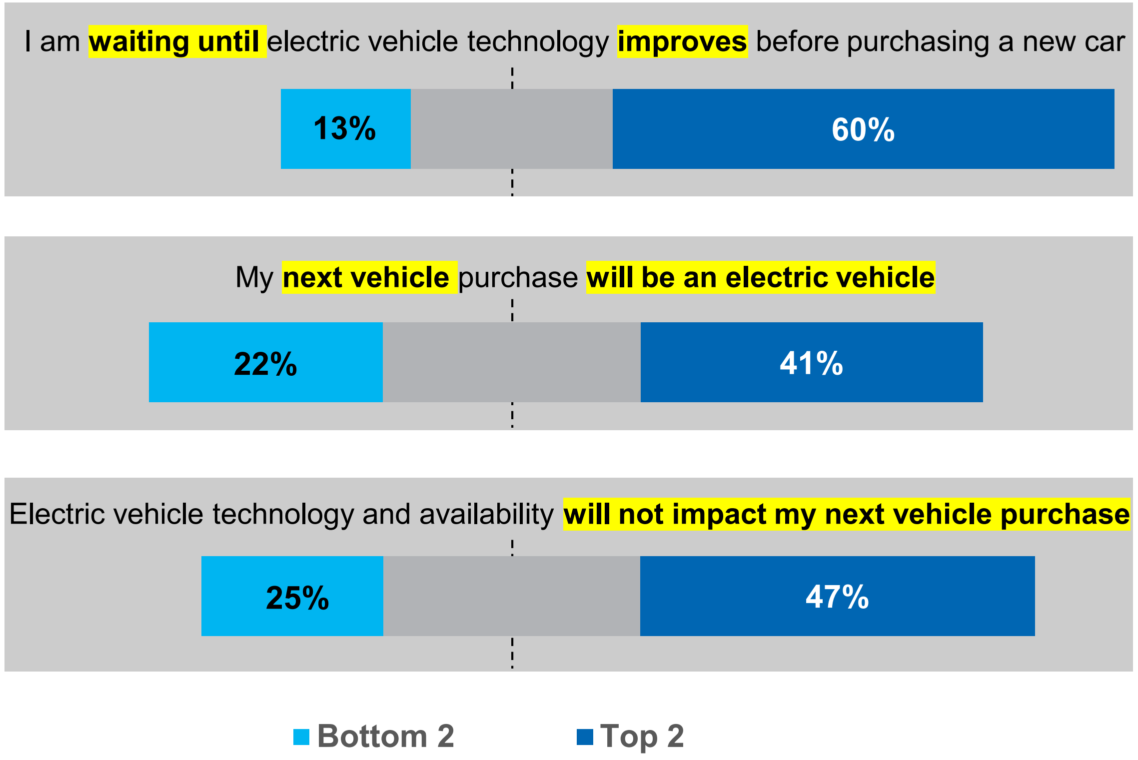
Source: S&P Global Mobility

Consumer confidence

Confidence in EV technology has decreased since 2021, with most consumers opting to wait until technology improves

Level of agreement with statement





Source: IHS Markit

The road to electrification – How long will organic adoption take

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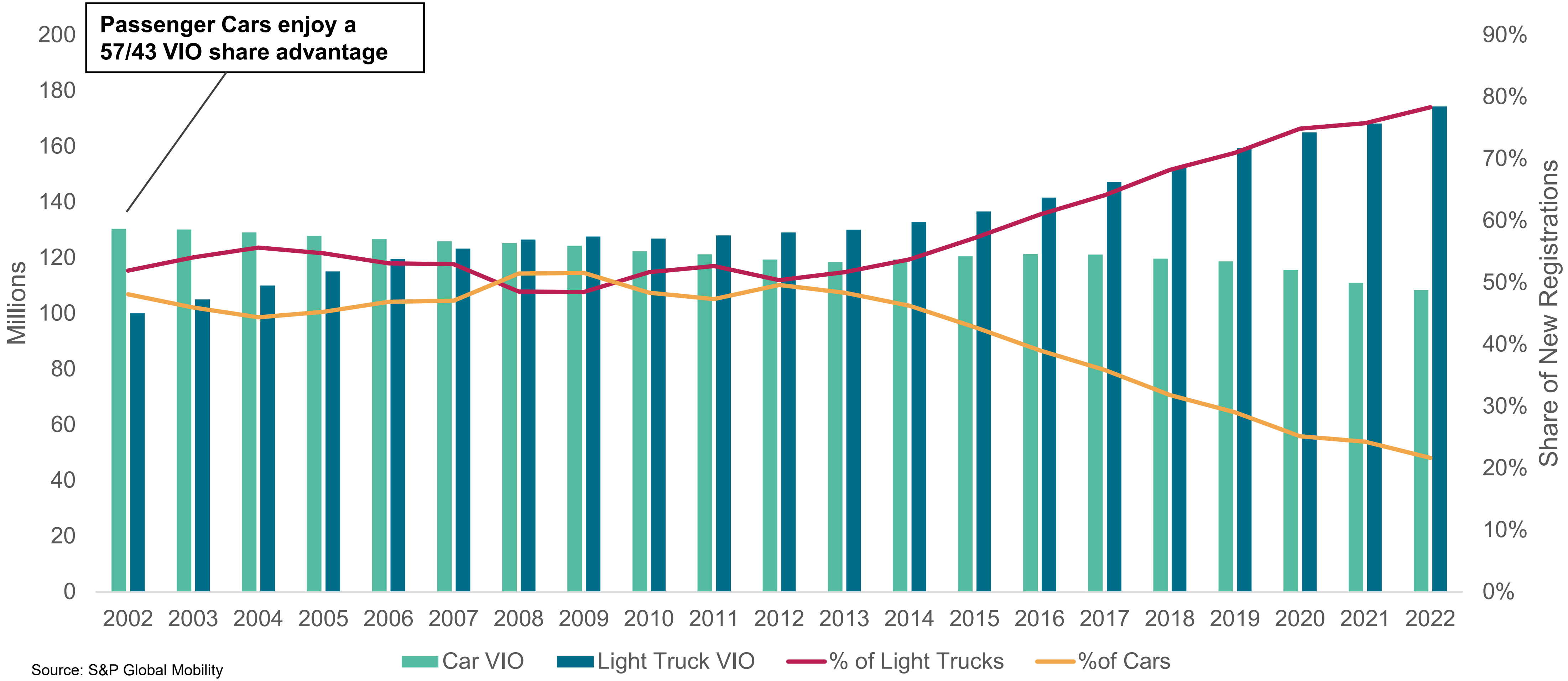
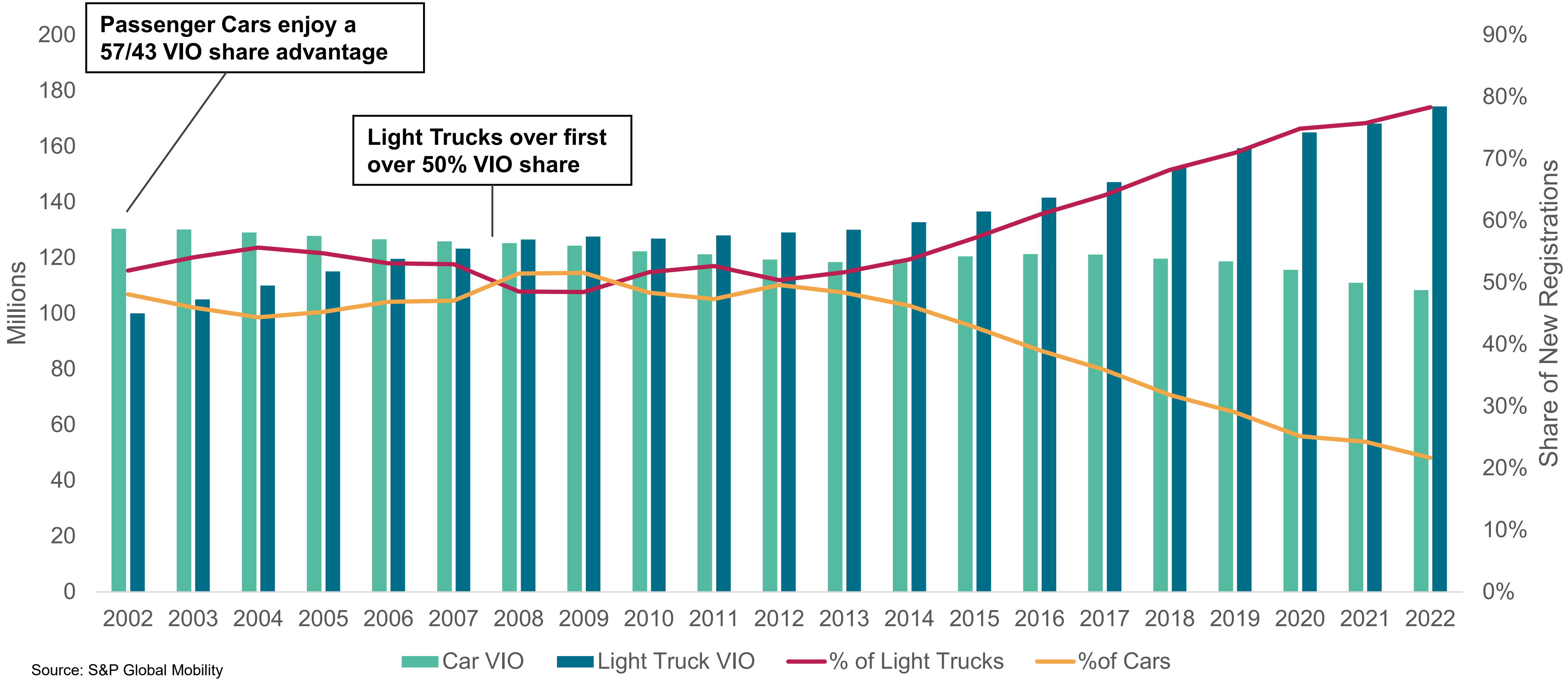
A walk down memory lane to conceptualize the shift from ICE to EV



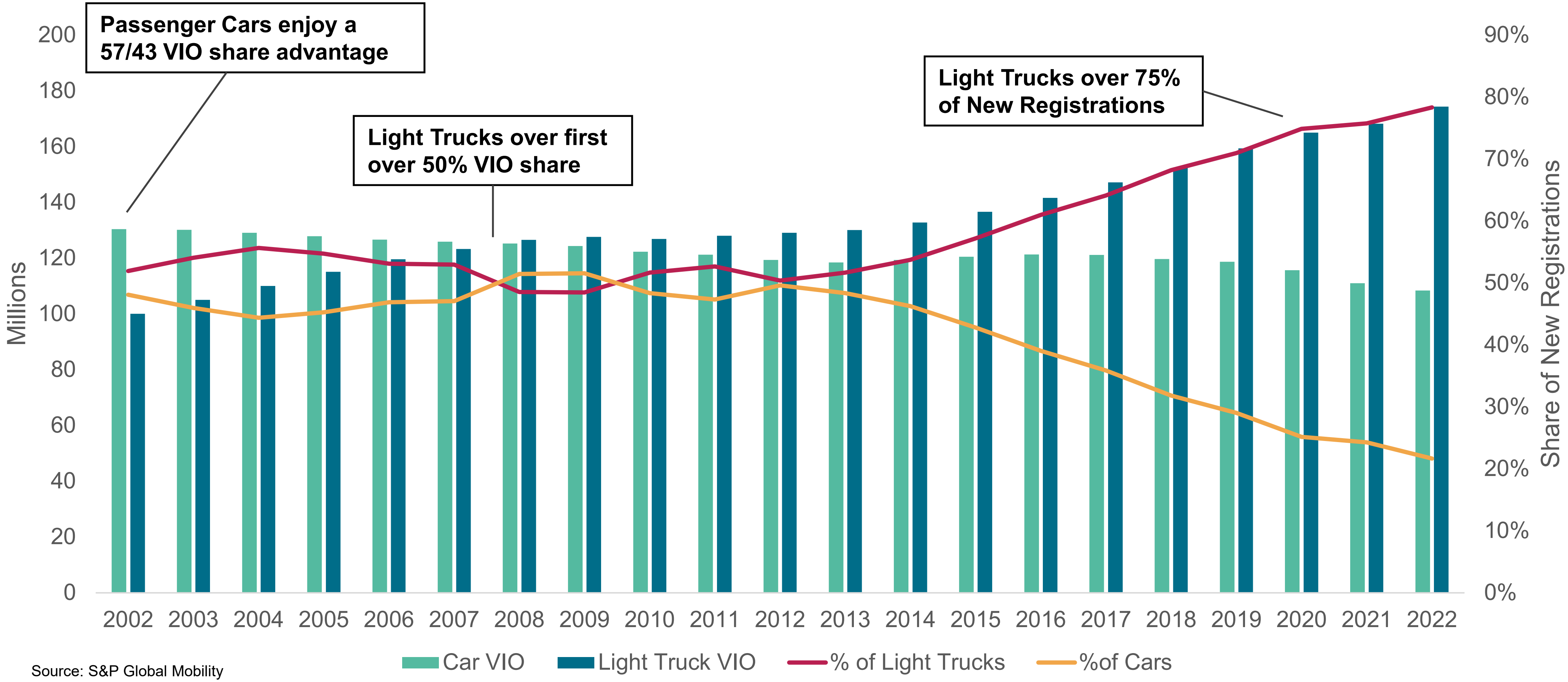
Source: S&P Global Mobility

Nearly a decade passes during which time Light Trucks gain a moderate VIO share advantage



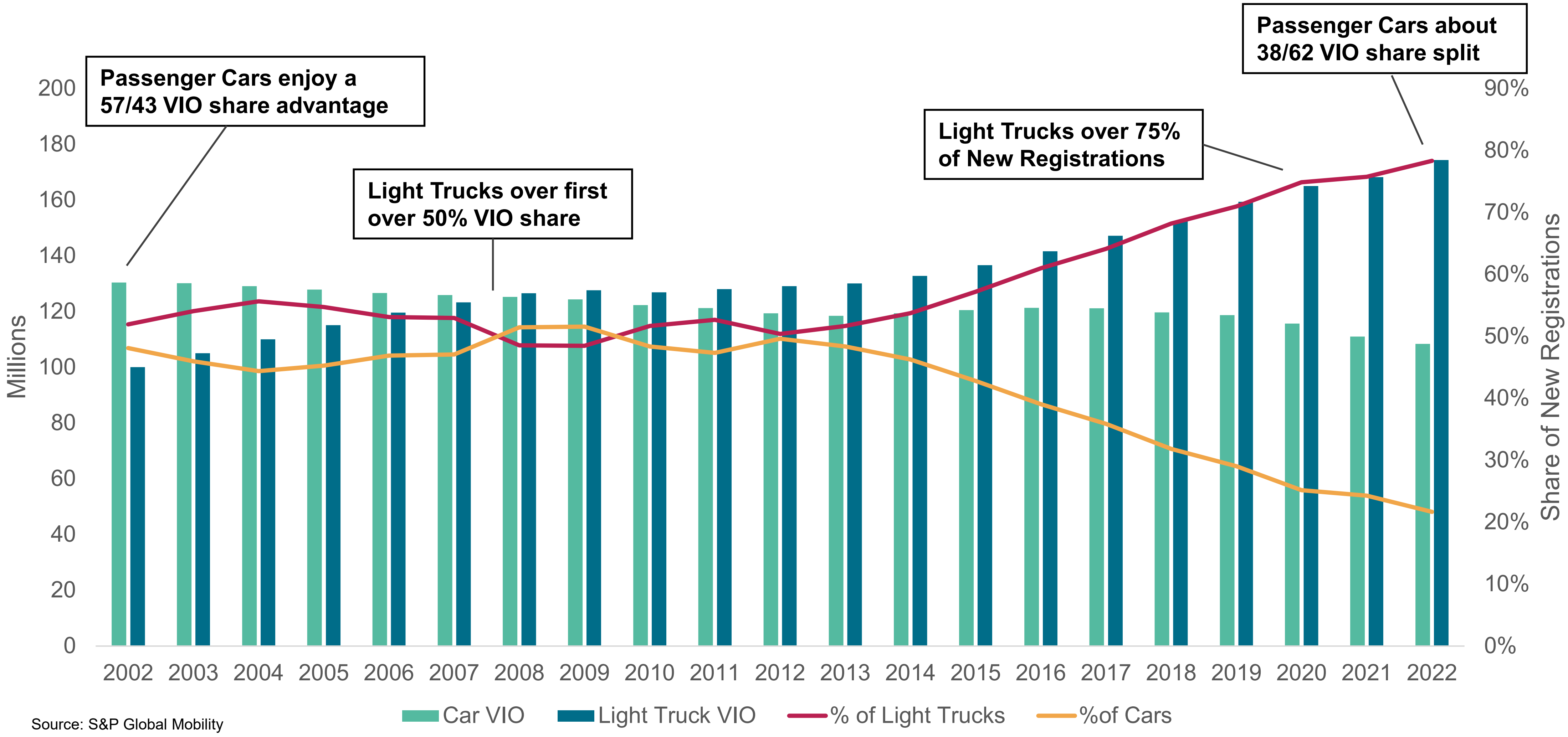
Source: S&P Global Mobility

After nearly another decade, Light Truck New Registrations enjoy a 3:1 advantage over passenger cars



Source: S&P Global Mobility

After two decades, impact of shift becoming more evident



Source: S&P Global Mobility

Wrap up

Summary

The ever-changing vehicle fleet is trending in a positive direction for the aftermarket

- Increased repair opportunities to continue as new vehicle supply cannot keep pace with demand causing older vehicles to stay on the road longer
- Inflation and increasing interest rates have caused further new vehicle demand destruction and will continue to drive longer vehicle lifecycle in existing fleet
- Average age likely to experience upward pressure thru at least 2024 due to constrained new vehicle sales
- Vehicle usage has exceeded 2019 levels, even though the way people use their vehicles may have changed for the foreseeable future.
- Confusion and consternation around the rollout of BEV’s may cause consumers to take a prolonged wait and see approach

Vehicle Fleet is healthy and growing

- Healthy and growing even amid low new vehicle sales. Consumers continue to demonstrate that they want vehicles in their driveway.

VMT bounced back and is growing, but is different

- Pandemic impacted overall travel for one moment in time, but also changed congestion patterns as more individuals continue to work remotely

Fuel Prices climbing could be a drag on VMT

- Between the Russia/Ukraine war, recession fear and inflation, the price of fuel remains high – which could be a headwind for VMT

Ongoing Supply Chain challenges continue

- The complexion of the vehicle fleet will continue to be changed by ongoing challenges as new vehicles cannot meet demand, and older vehicles are forced to stay on the road longer

Q&A

Thank You!

For more information on S&P Global Mobility, please visit:
https://www.spglobal.com/mobility/en/

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