

CWIEME
BERLIN

14-16 MAY 2024
MESSE BERLIN



The Electrification Era

Technology and Supply Chain Dynamics Influencing xEVs Take Rate

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S&P Global
Mobility

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A decorative graphic consisting of several thick, curved lines in orange, pink, black, light blue, and dark blue, sweeping upwards from the bottom left towards the right side of the slide.

Agenda

- S&P Global: research in automotive & charging
- Consumer sentiment about EVs and charging
- Vehicle in Operation forecast
- Latest advancements about batteries and expected driving range
- Charging infrastructure deployment outlook
- Conclusions

Our five divisions focus on distinct markets-and together, they deliver unmatched breadth and depth.

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S&P Global Mobility Unmatched Credentials

100%

of the top automakers
14 OEMs with revenue greater than \$50 billion

100%

of the top medium & heavy commercial vehicle providers

100%

of the top automotive suppliers with revenue greater than \$5 billion

900+

automotive experts on the ground in 16 countries, plus select experts across industries available

1000

data sets across the entire value chain of transportation

100%

coverage of global long-term forecasts of light & medium/heavy commercial vehicle sales & production

90+

countries covered for new vehicle registration data

95%

VIO coverage for 70+ countries linked to industry standard coding

90%

of US DMVs and top insurers use our VIN solutions

100%

of OEMs in the United States use CARFAX for CPO programs

SP Global Mobility EV Offering Overview

Vehicle Production



Alternative Propulsion Forecast (LV)



MHCV Engine Forecast (MH)



Vehicle Performance & Compliance (LV)



EV Engineering Standards (LV & MH)

Vehicle Sales



(US) Predictive Audiences (LV)



New Registrations/Sales (LV & MH)



Powertrain Sales Forecast (LV)



Long-term Trends (LV & MH)

Vehicles in Operation



Vehicles In Operation (LV & MH)



VIO Forecasts (LV)



Aftermarket Solutions (LV & MH)

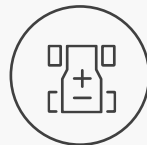
Components & Technologies



E-Mobility Reports, Supplier Profiles, News (LV)



Mobility Insights, Forecasts, and New BEV Entrants (LV)



Component Level Forecasts

High voltage battery
E-Motors & Power Electronics
Vehicle-side charging technology



Electronic Parts Sourcing



Battery Materials

Charging Infrastructure



Vehicle-side charging technology Forecast (LV)

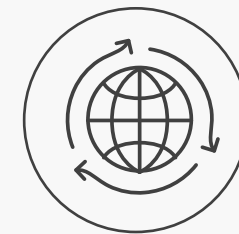


Sub-national charging infrastructure forecast (Coming in 2025)



EV Charging Infrastructure Location Planning

Advisory



Through an unparalleled depth of understanding, S&P Global Mobility Automotive Advisory brings together best-in-class data assets, experts and insights to support the needs of our clients, driving critical decisions with speed and confidence.

Our consultants cover a range of key topics across the electrification landscape designed specifically for your unique challenges.

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Consumer sentiment about xEVs and charging

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S&P Global Mobility Consumer Insights: Global Coverage

Four core megatrends set the foundation for consumer sentiment

- 8 key markets:
 - United States
 - Brazil
 - Mainland China
 - India
 - Japan
 - South Korea
 - United Kingdom
 - Germany
- 1,000 respondents per market
- Survey countries represent the key global established and emerging automotive markets



Autonomous Driving



Connected Car



E-Mobility

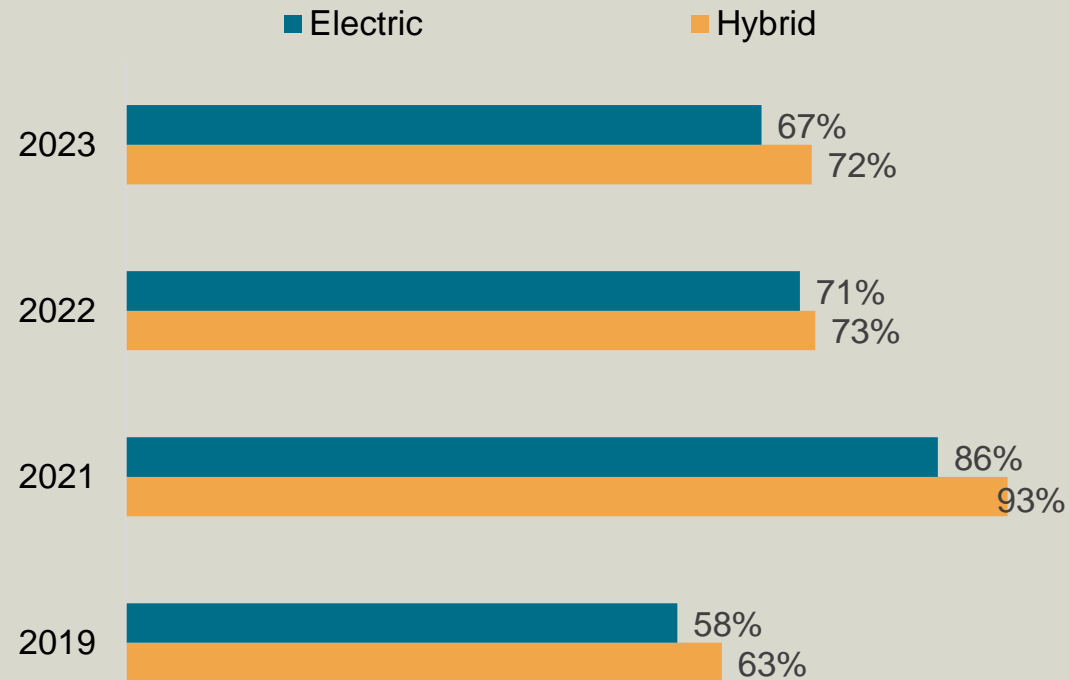


User Interface (HMI)

Consumer openness and buying decisions

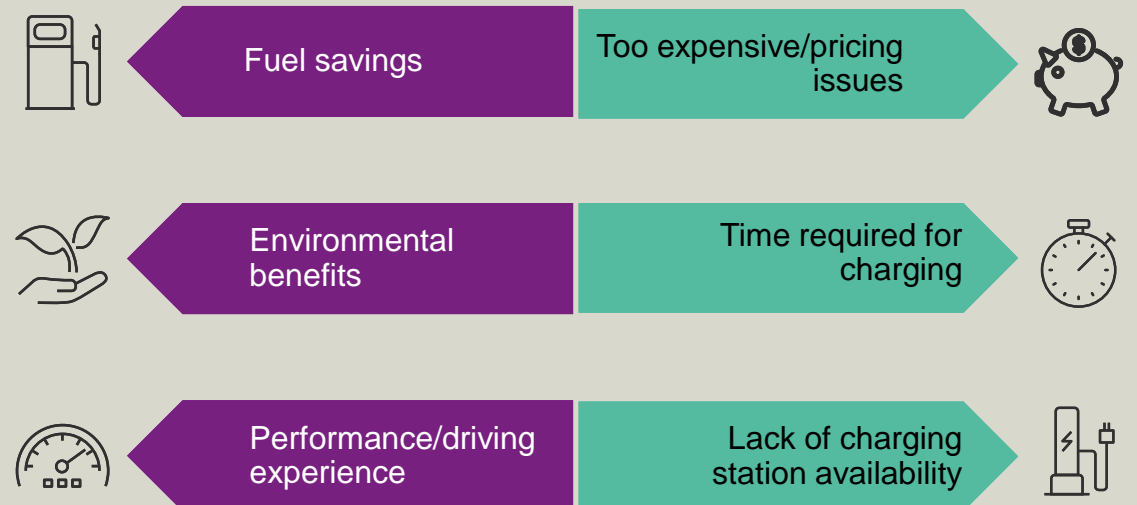
Skepticism toward EV technology continue to grow and while industry and macroeconomic factors help drive adoption of electrification pricing, battery technology, and charging infrastructure remain barriers

Openness to purchasing electric or hybrid



As of May 2023
 2023 N=5,166 (US: 622; UK: 701; DE: 700; CH: 624; JP: 588; SK: 588; IN: 641; BR: 702)
 Source: S&P Global Mobility.
 © 2023 S&P Global.

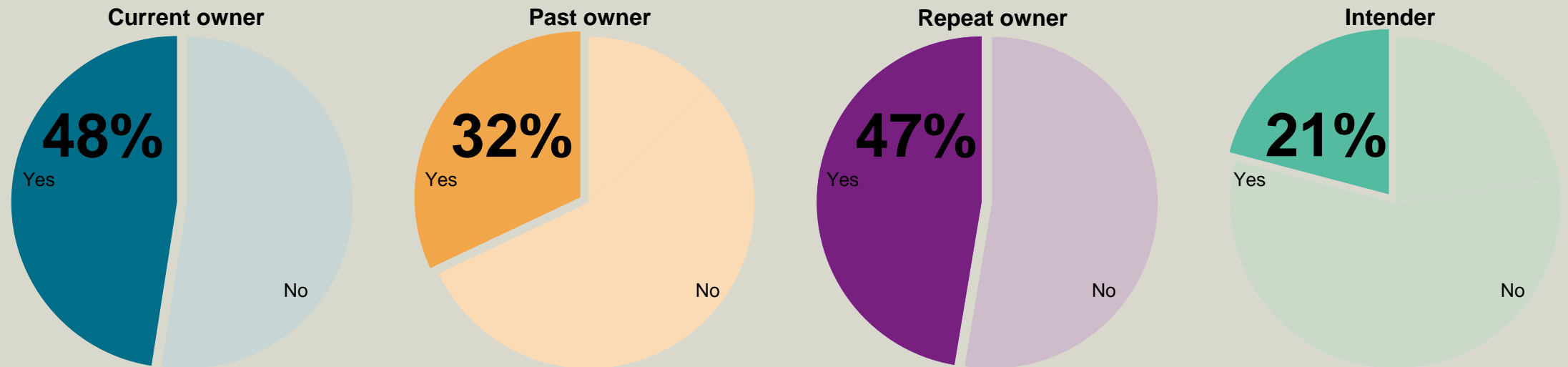
Reasons for and against purchasing an EV/hybrid



Charging infrastructure

EV charging infrastructure remains mostly insufficient for many consumers, particularly for intenders

Charging infrastructure is sufficient for my needs



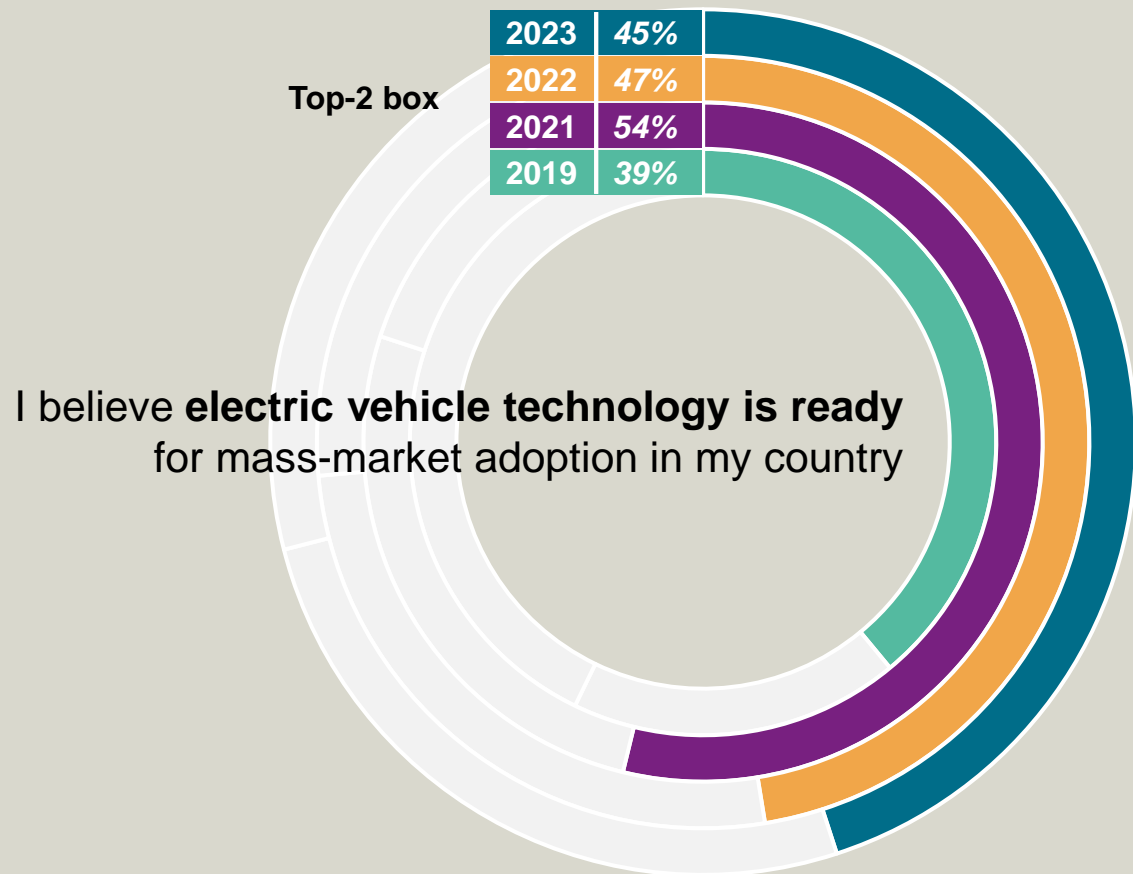
More consumers are aware of available charging stations near their home or workplace but continues to be a key barrier to widespread adoption of EV technology.

As of May 2023
N=7,449 (US: 917; UK: 1,001; DE: 929; CH: 924; JP: 888; SK: 886; IN: 941; BR: 963)
Source: S&P Global Mobility.
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Consumer confidence

Confidence in EV technology has been decreasing since 2021 with fewer considering an EV for their next vehicle purchase

Level of agreement with statements



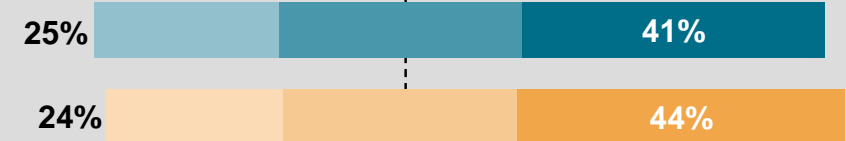
I am **waiting until** electric vehicle technology **improves** before purchasing a new car



My **next vehicle** purchase **will be an electric vehicle**



Electric vehicle technology and availability **will not impact** my next vehicle purchase



2023 **Bottom 2** **Top 2**
 2022 **Bottom 2** **Top 2**

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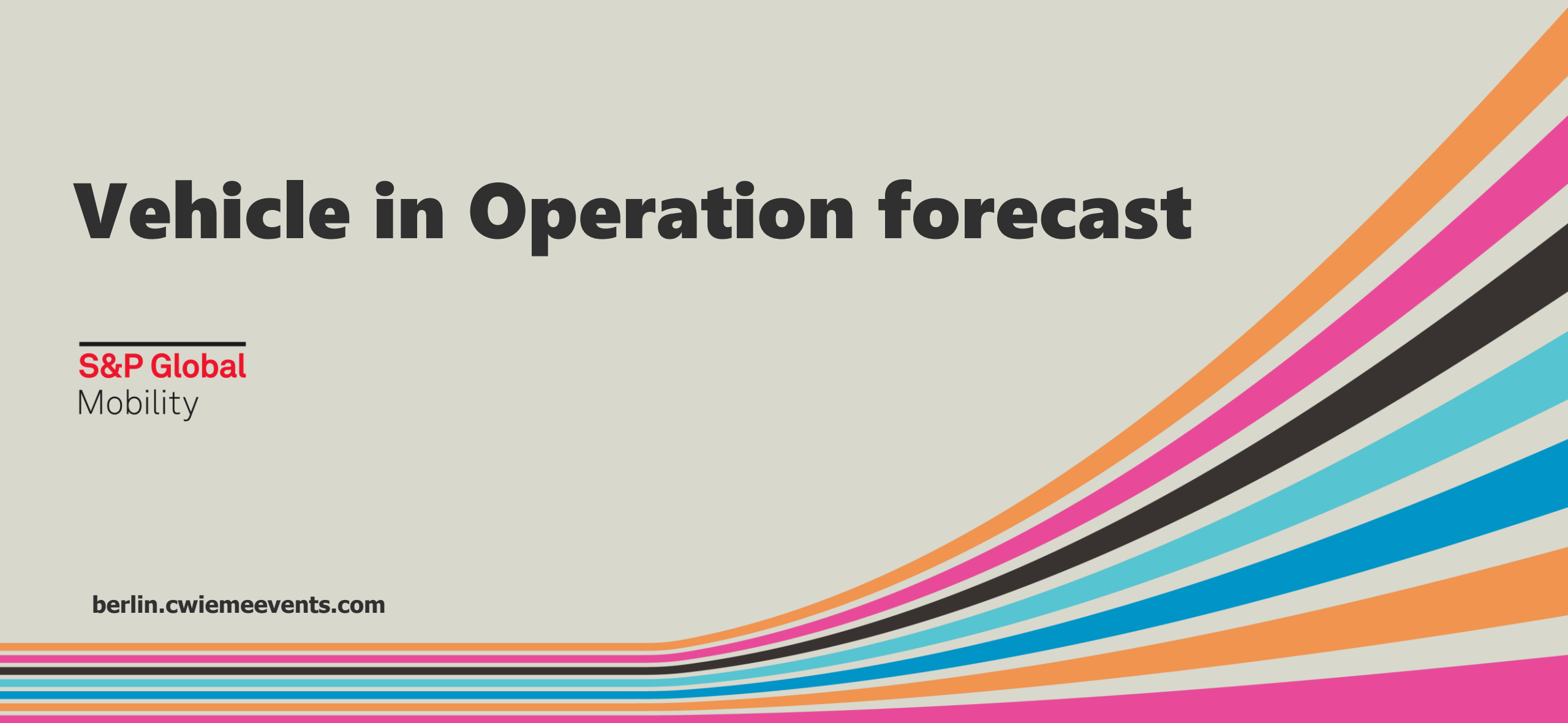
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Vehicle in Operation forecast

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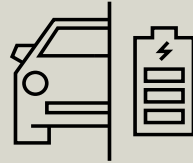
E-mobility Technology VIO

How Electrification Are Propagating Over Time in the vehicles in operations (VIO)



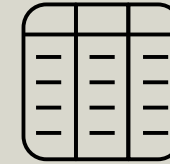
60+

Countries/territories with hundreds of attributes to identify new markets.



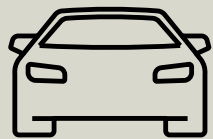
40+

Vehicle attributes available both as Actuals and Forecast



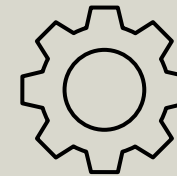
12 years

Of forecast + VIO actuals



3 Vehicle Domains

Covering battery, e-motor and charging data



100+

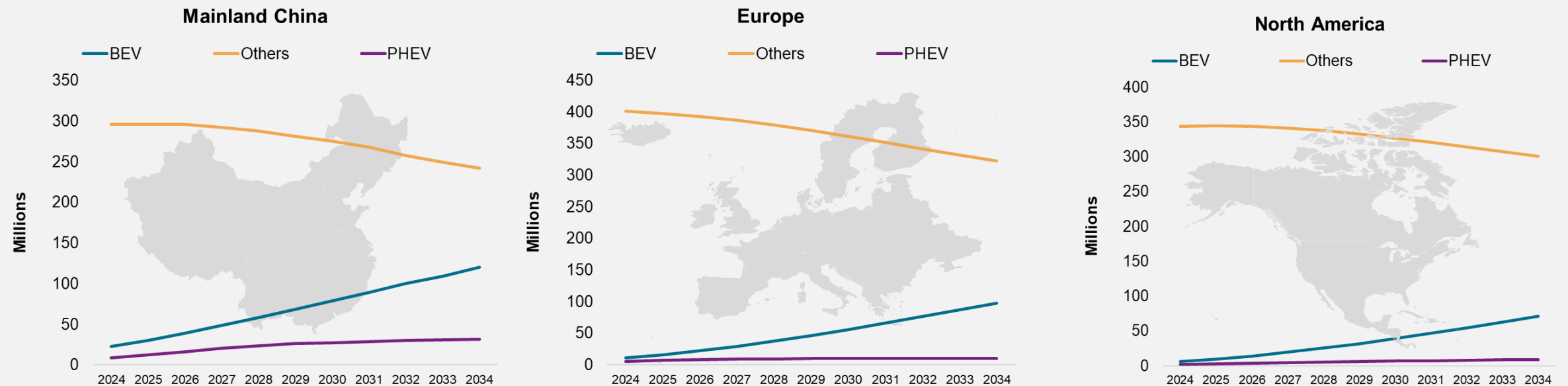
attributes specifically connected with the components domain intelligence

Source: S&P Global Mobility, VIO (Vehicles-in-Operation) Actuals and Forecasts

Regional perspective for the VIO Forecast

Mainland China EVs presence will catch up conventional cars over the next 10 years with a strong decline of ICEs

Market share by PSD and Region for VIO up to 2034

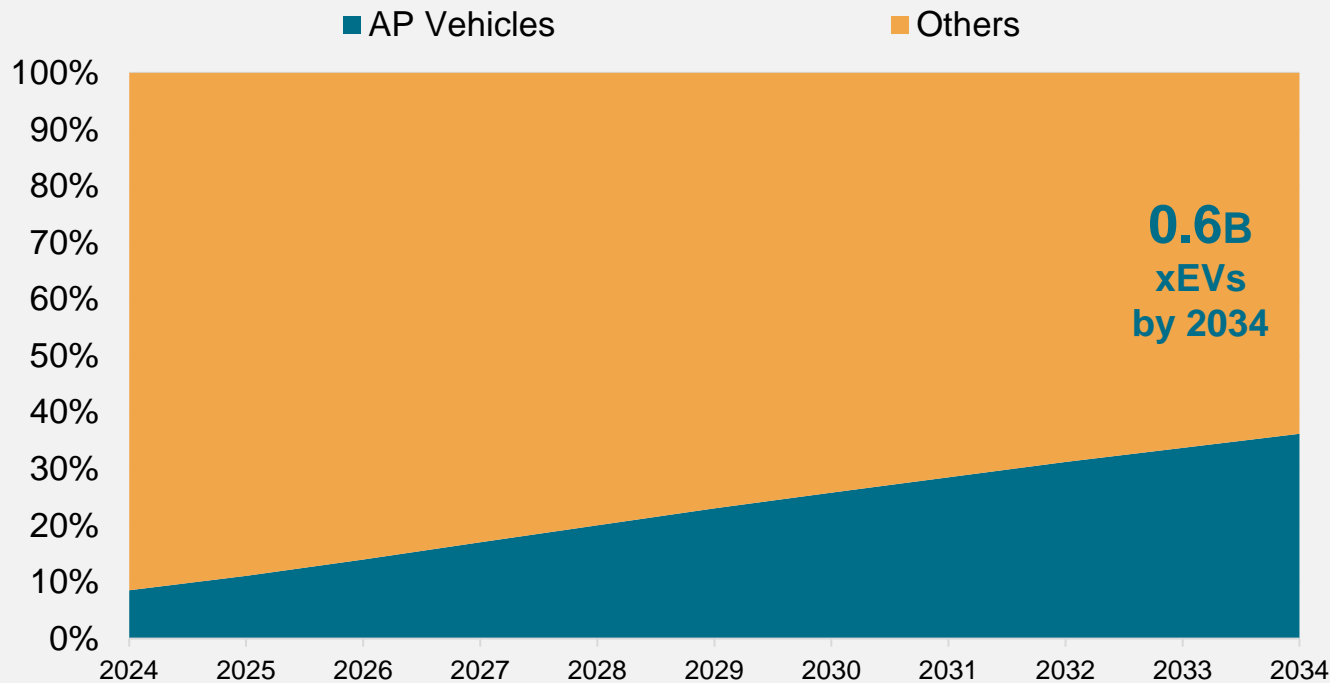


Note: BEV portion also include REEVs vehicles
Source: S&P Global Mobility, VIO (Vehicles-in-Operation) Actuals and Forecasts, February 2024

Vehicle-in-operation (VIO) Forecast per Propulsion System Design

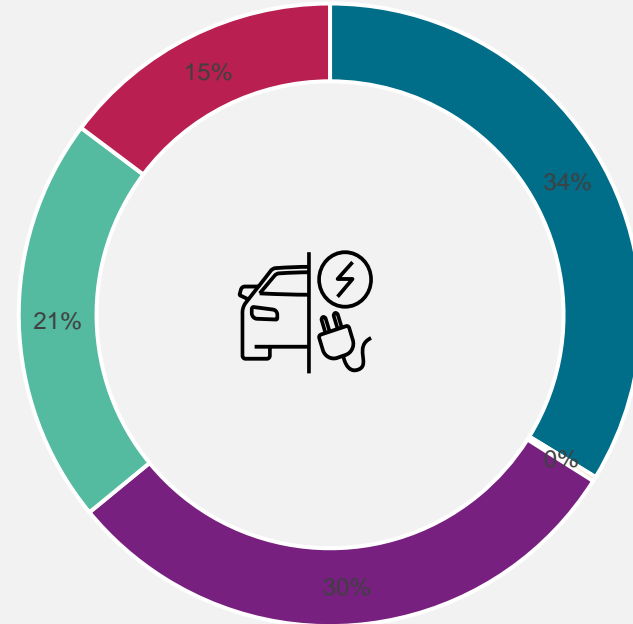
AP vehicles will grow at a fast pace hitting 36% of the market by 2034, BEVs will get most of this market share

Market share of AP vehicles up to 2034



AP Vehicles by fuel type in 2034

BEV FCEV HEV MHEV PHEV

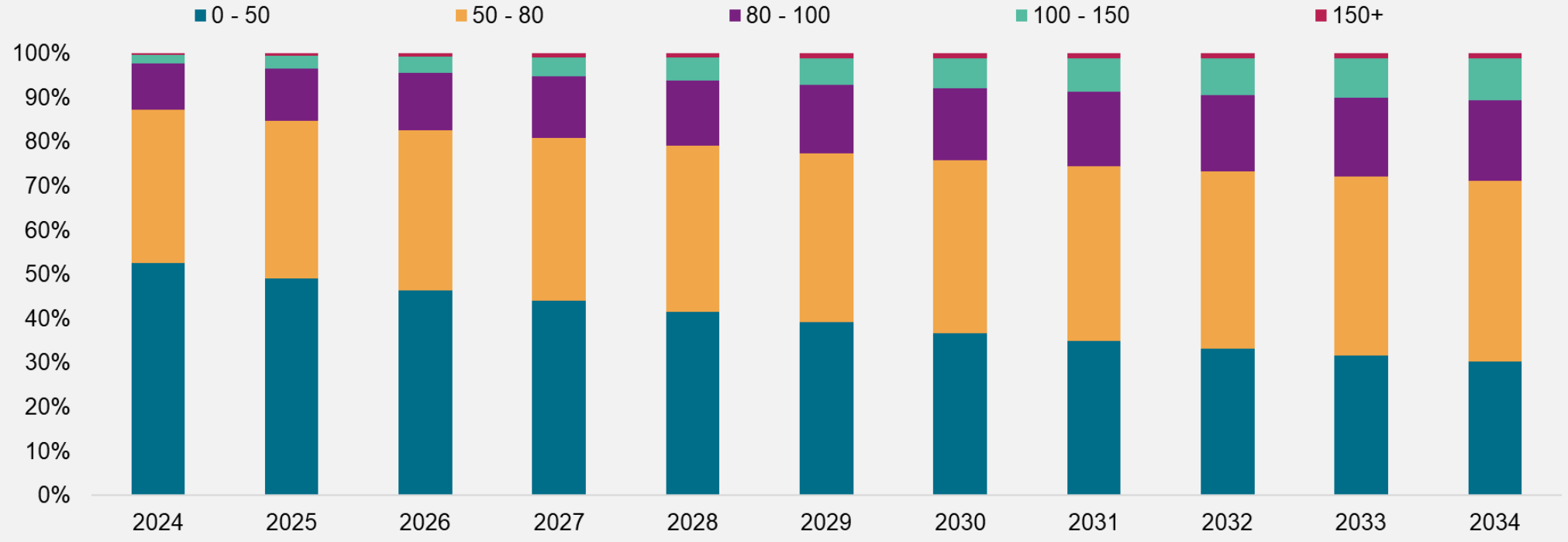


Note: BEV portion also include REEVs vehicles
Source: S&P Global Mobility, VIO (Vehicles-in-Operation) Actuals and Forecasts, February 2024

Are the batteries getting larger in the near future?

A global trend towards larger batteries is expected by 2034 with more than 60% of cars having 50kWh+ size

Market share by battery dimension (kWh) for VIO up to 2034



Note: BEV portion also include REEVs vehicles
Source: S&P Global Mobility, VIO (Vehicles-in-Operation) Actuals and Forecasts, February 2024

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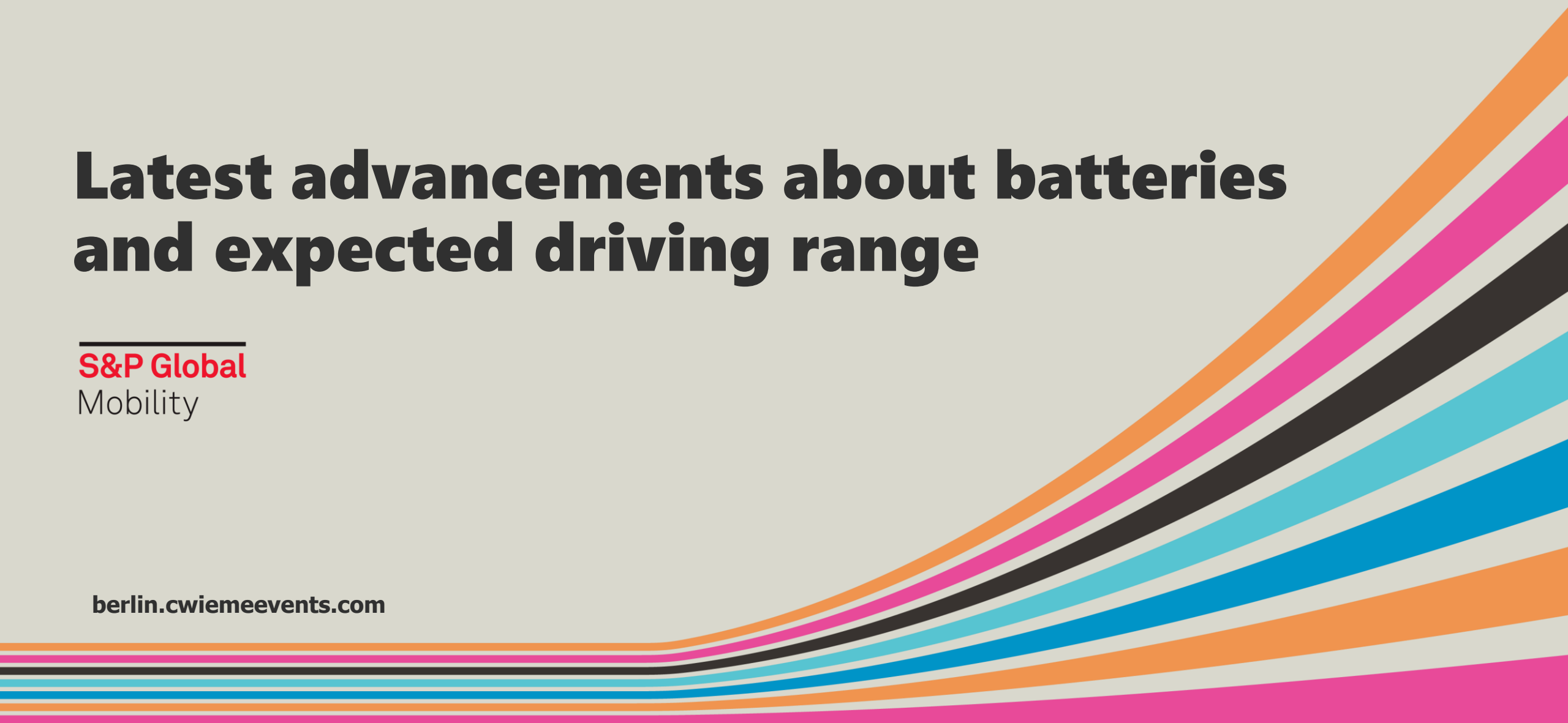
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Latest advancements about batteries and expected driving range

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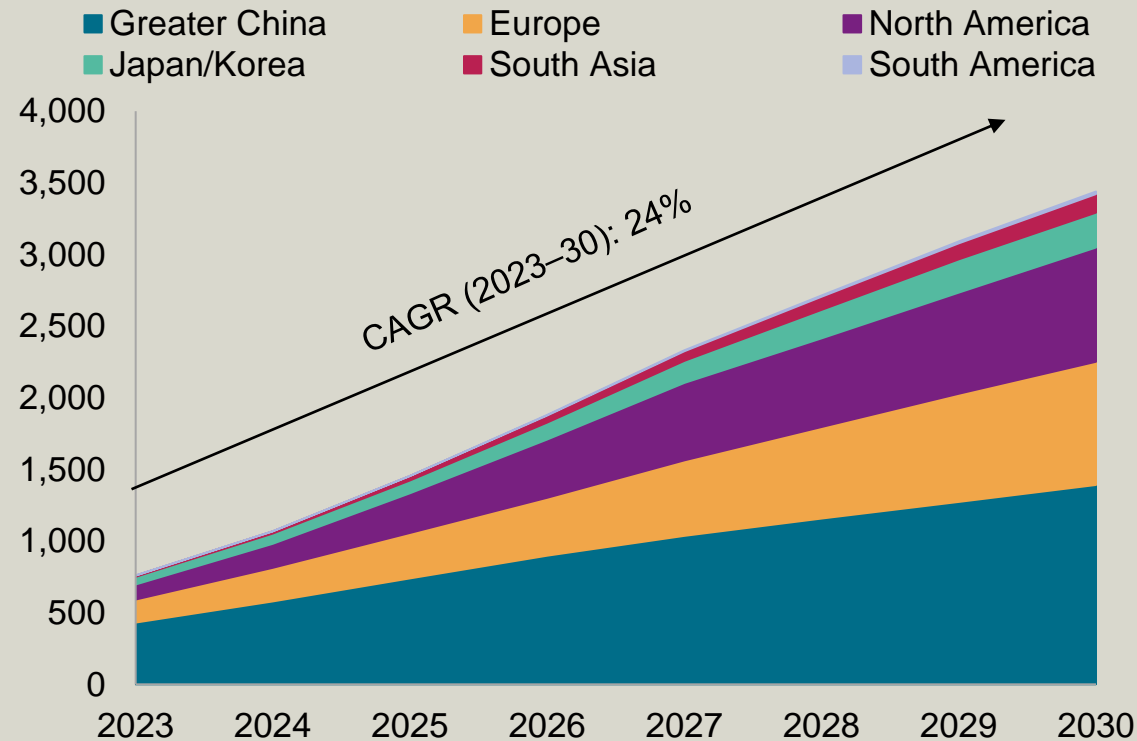
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Global battery demand

Growth rate of Greater China to slow, but it will remain the largest market through 2030.

Battery demand light duty vehicle application per region (GWh)



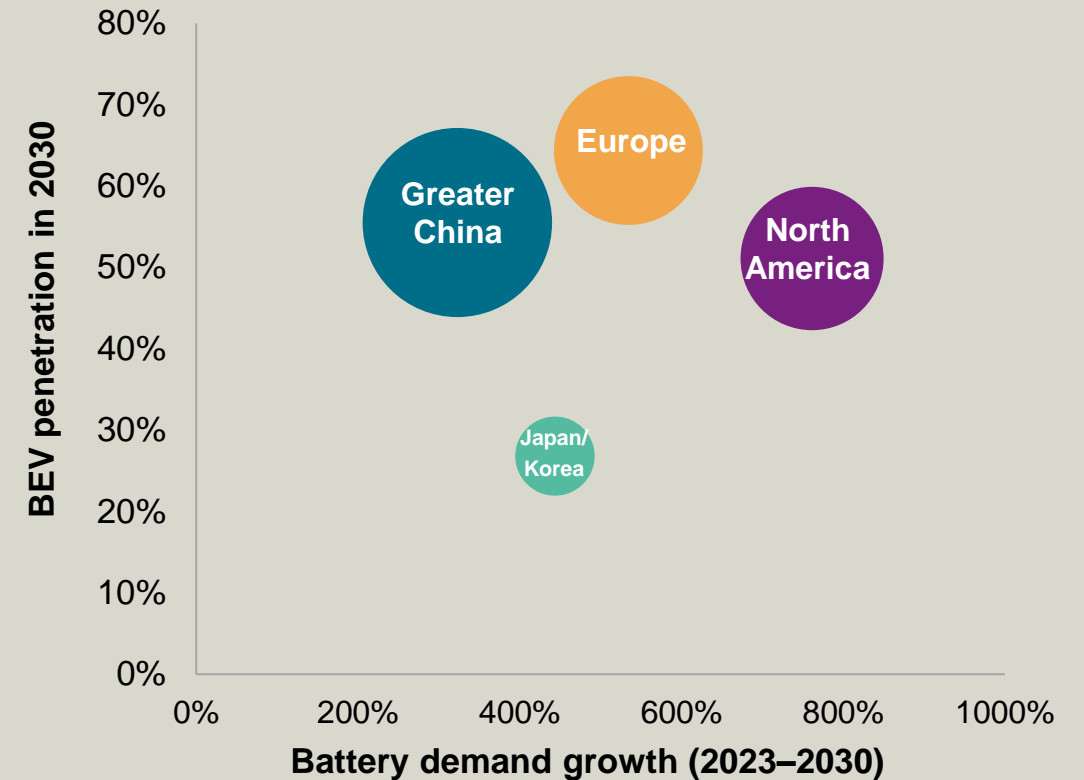
Data compiled Jan. 12, 2024.

CAGR = compound annual growth rate.

The demand figures represent the battery demand in the automotive light duty vehicle sector.

Source: S&P Global Mobility, High Voltage Battery Forecast, data as of January 2024.

Regional demand growth vs. BEV penetration



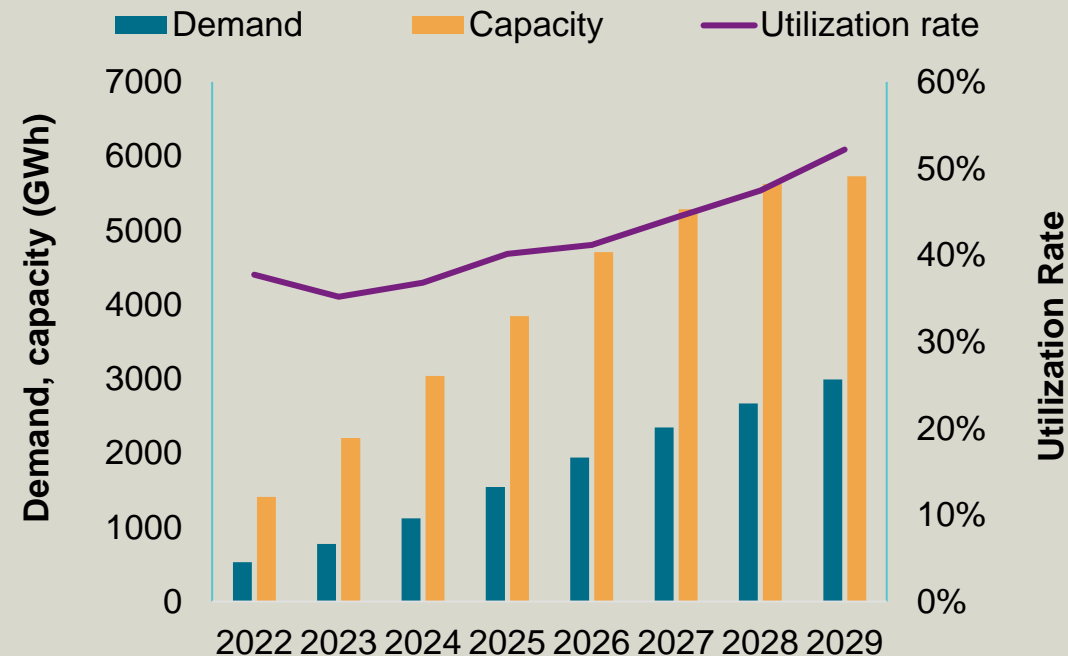
BEV = battery-electric vehicle.

Bubble size shows the automotive battery demand in gigawatt-hours in 2030.

Supply vs. demand for battery cell

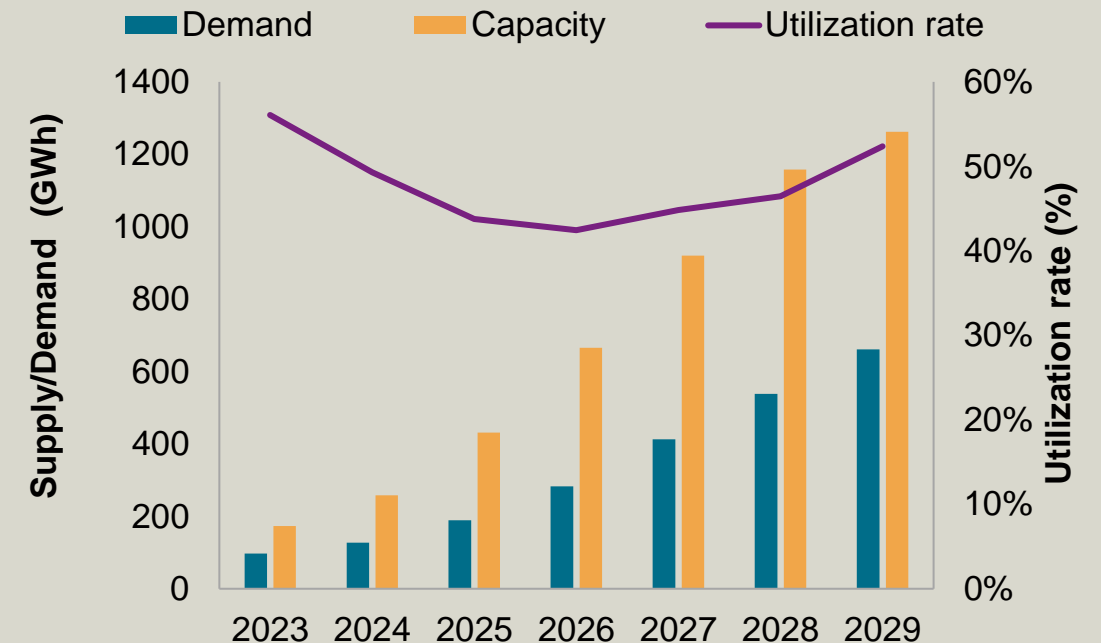
At global scale, the announced capacities exceed the projected demand. Local restrictions might exist.

Supply vs. demand for battery cells



Data compiled Jan. 12, 2024
 GWh = Giga Watt-hour
 Notes: The demand includes only the batteries used in light duty vehicle sector, capacity refers to the announced capacities.
 Utilization rate = demand / capacity
 Source: S&P Global Mobility, Global auto battery-cell production capacity tracker, September 2023
 © 2024 S&P Global.

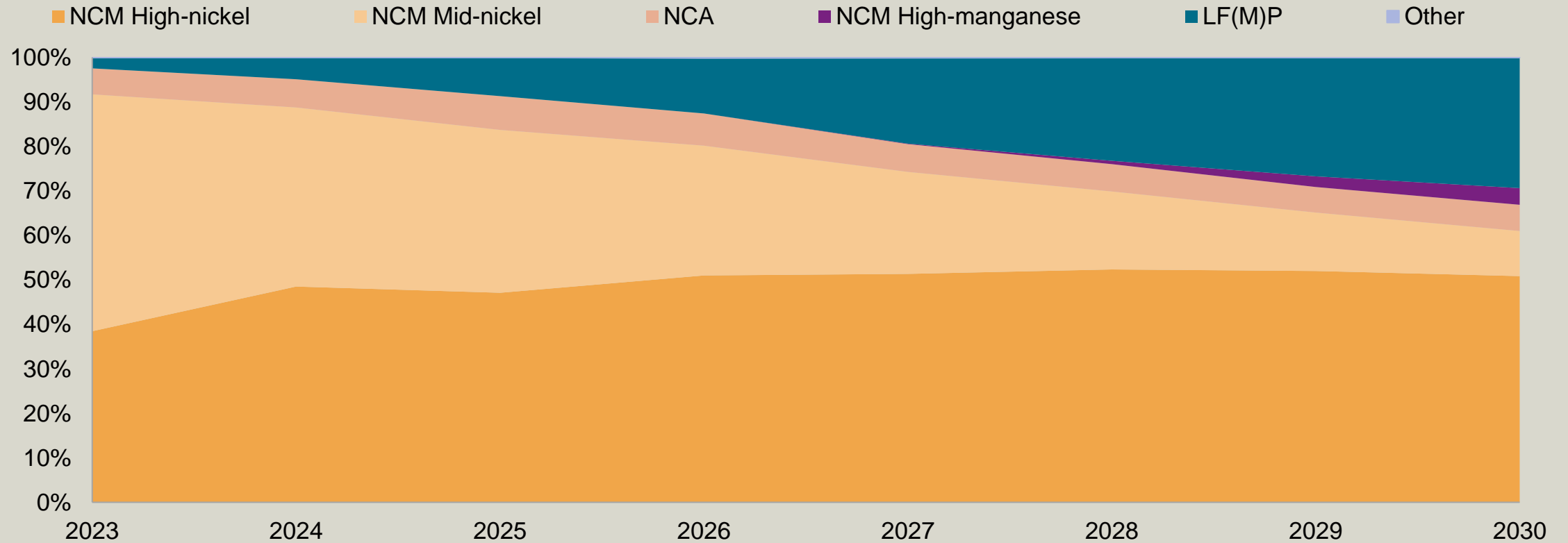
Supply vs. demand for battery cells in Europe



As of Mar. 13, 2024.
 Source: S&P Global Mobility.
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Cathode chemistry trend in European cars

LFP chemistries will expand in Europe because of the new battery production Chinese facilities and the growing demand of «mass market» vehicles



As of Mar. 27, 2024.

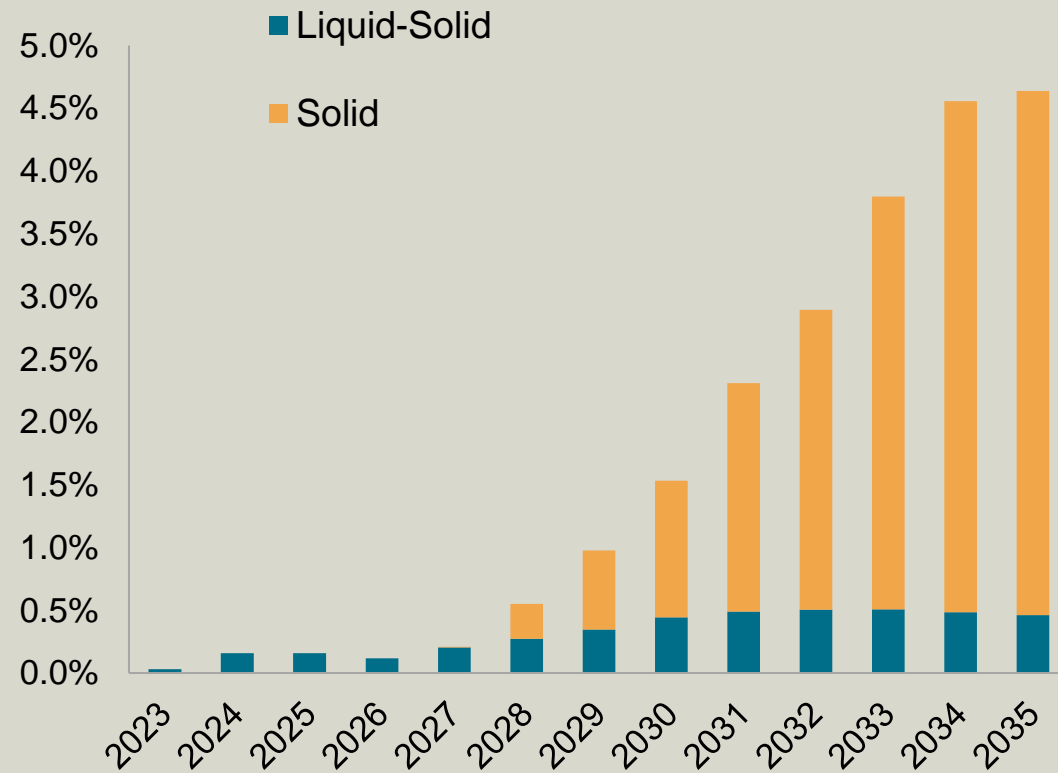
Source: S&P Global Mobility, High Voltage Battery Forecast, data as of March 2024.

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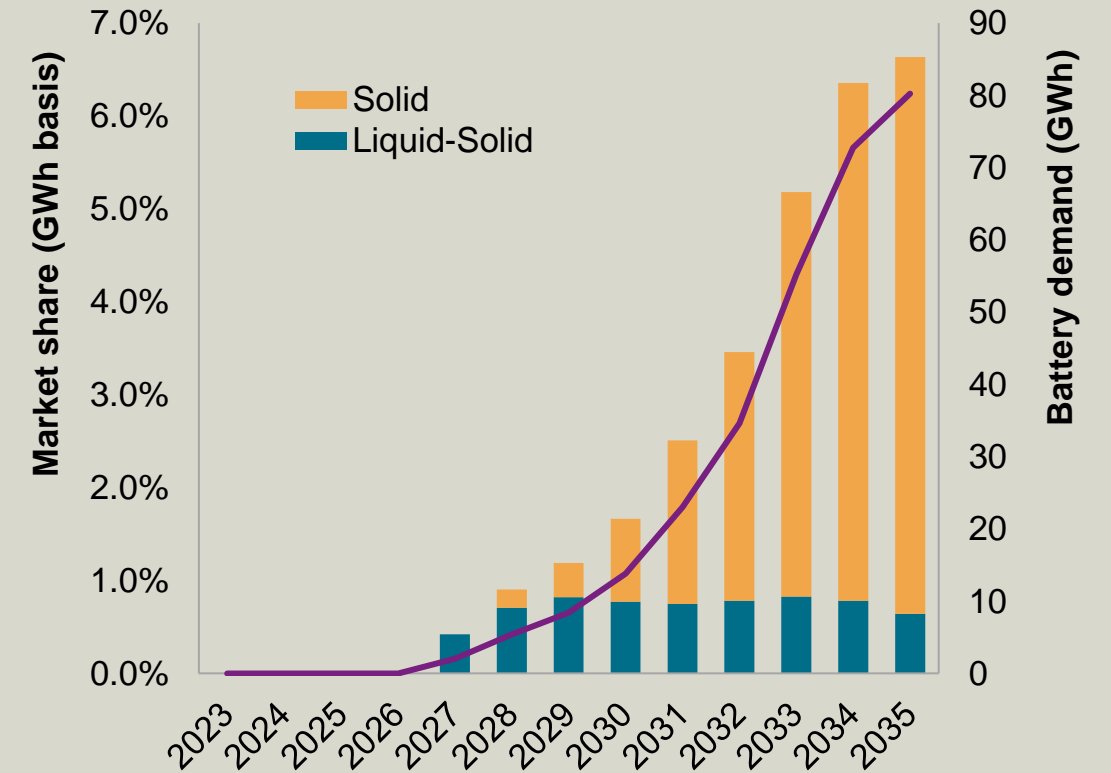
Solid state battery market outlook

The adoption of the technology is projected to surpass 1% after 2030.

**Solid state battery market outlook by type
(% of total battery demand)**



Solid state battery market outlook by type in Europe



Data compiled Feb. 7, 2024.
Source: S&P Global Mobility.

As of Mar. 27, 2024.

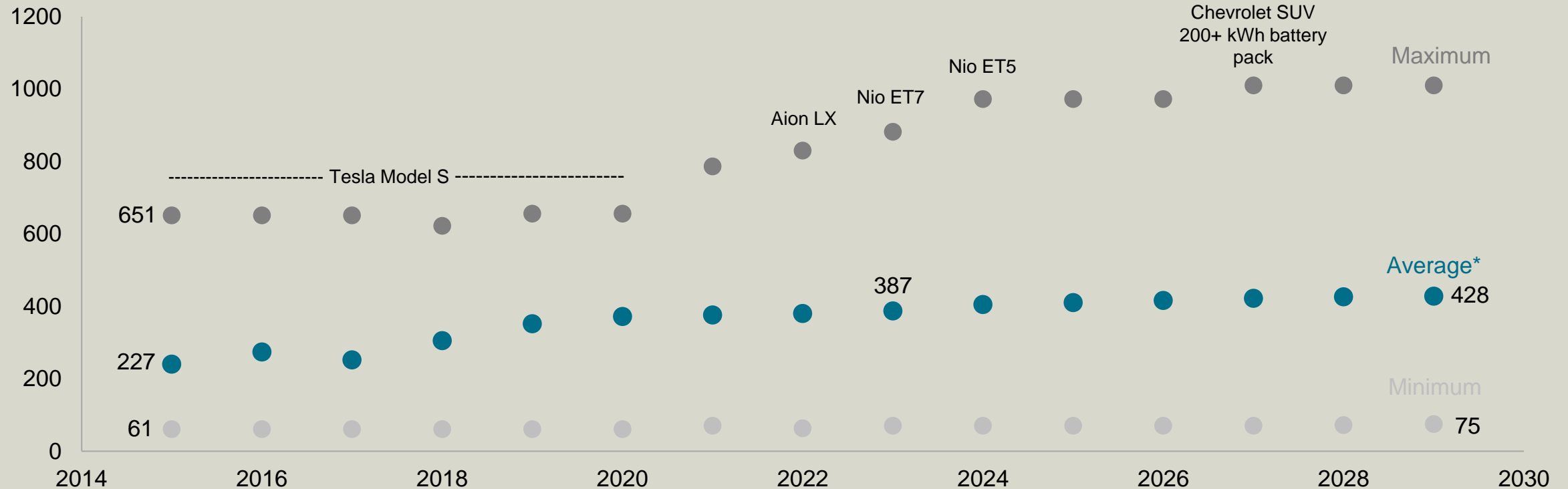
Source: S&P Global Mobility, High Voltage Battery Forecast, data as of March 2024.

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How is driving range evolving?

As we gravitate towards larger batteries, driving range increases in consequence

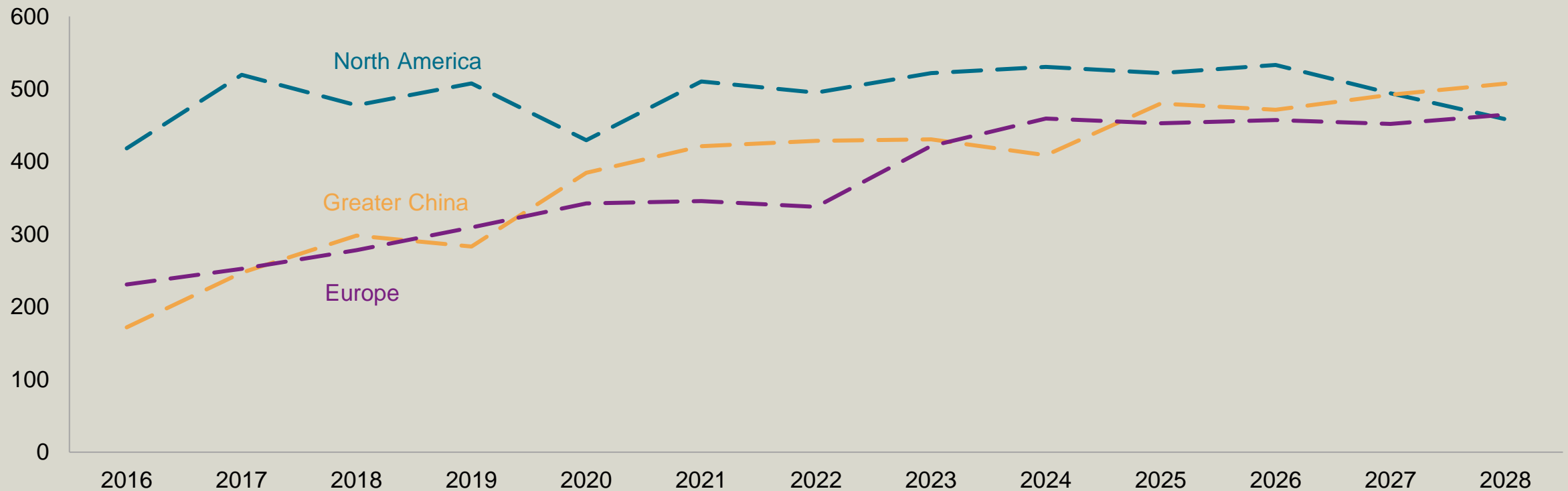
WLTP all-electric range (km)



How is driving range evolving in different regions?

Driving range varies depending on the production region, however the gap diminishes significantly as years go by

Average WLTP all-electric range by production region (km)



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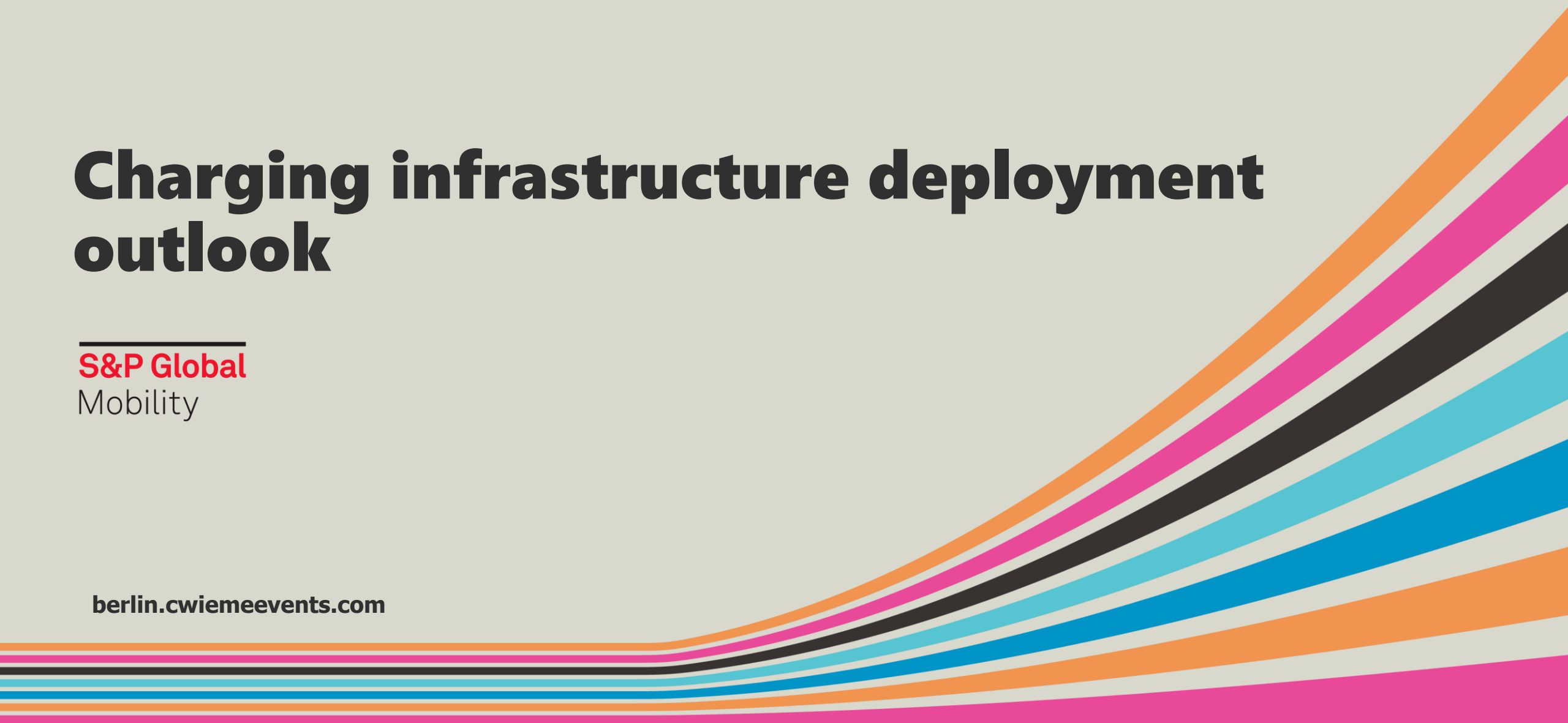
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Charging infrastructure deployment outlook

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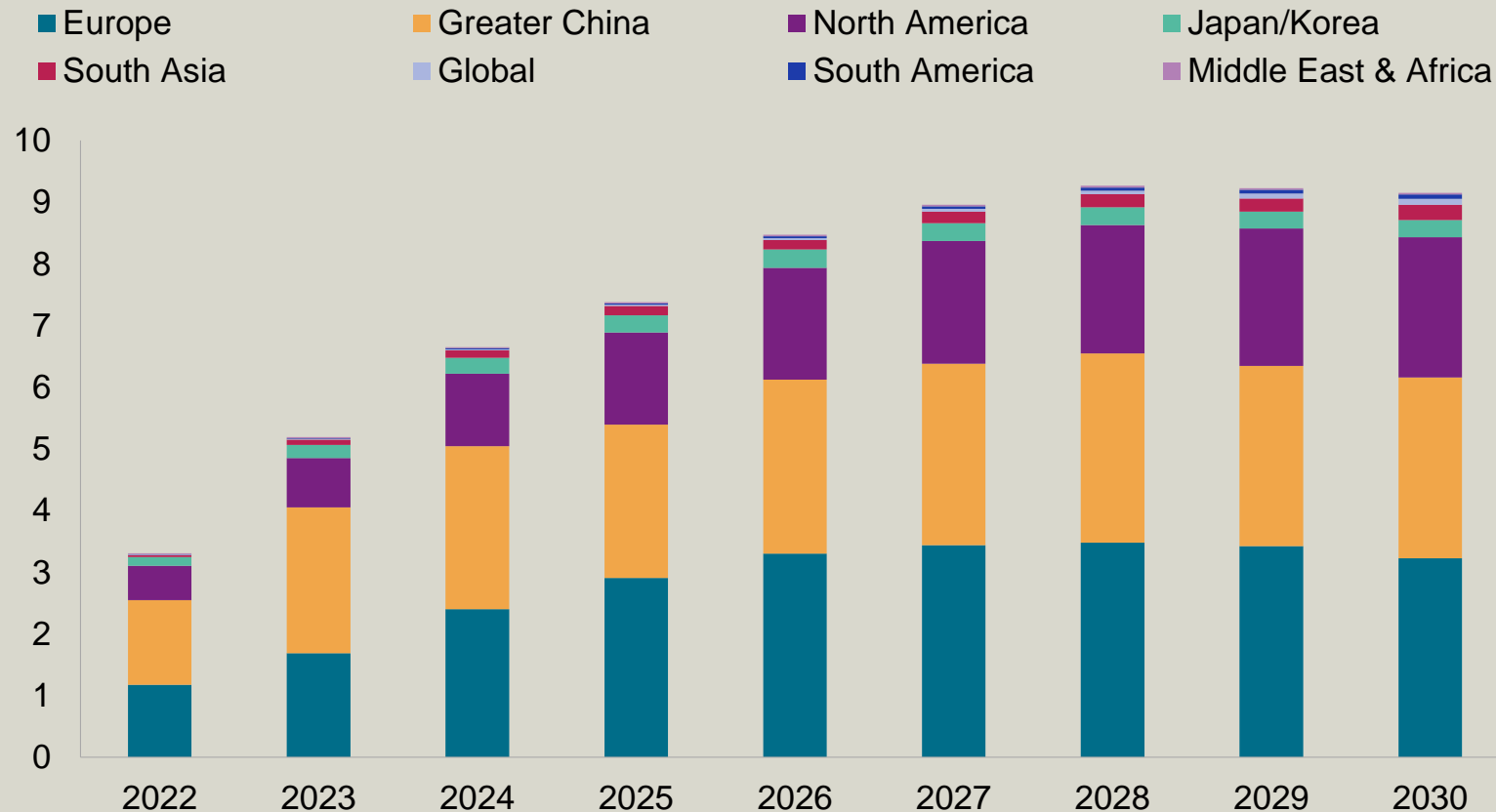
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Charging infrastructure annual regional deployment

Europe will take the lead in the speed of EV charging station deployment before the end of the decade

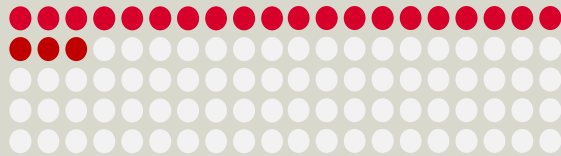
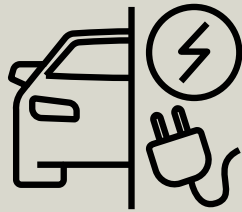
Annual EV charging station deployment by region, 2022–30 (million units)



- By 2025, Europe will have the highest installations per year, overtaking Greater China region.
- In 2030, Europe will install around 3.22 million chargers, whereas Greater China will install just over 2.9 million chargers in the same year.
- Most other regions will also witness progressive increase in charger installations.

Charging Infrastructure Landscape: How 2030 Might Look Like?

Europe will take the lead in the speed of EV charging station deployment before the end of the decade



23%

Of cars in operation are BEVs or PHEVs



In-Car Domain

123M

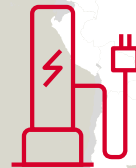
Of cables and cordset solutions



Domestic Domain

60M

Of domestic wallboxes



AC Public and semi-public

14M

Of AC Totem solutions



DC Public and semi-public

3M

Of DC and HPC stations

Note: Tesla superchargers are excluded, destination charge are included in AC public and semi-public domain
Source: S&P Global Mobility, vehicle in operation data, August 2023 - Charging infrastructure forecast, July 2023

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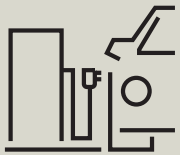
Conclusions

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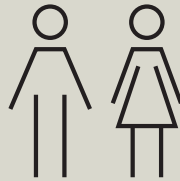
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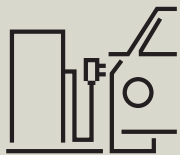
Key Takeaways



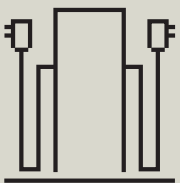
Electrification will increasingly supplement and displace gradually pure internal combustion engine technology. By 2033 more than 30% of vehicles in operation will have some degrees of electrification and about 20% will be “charging capable”. This will massively impact the charging infrastructure landscape.



Skepticism of consumer toward EV technology has grown (2023 Vs 2022) with pricing and charging remaining barriers. Operative range seems to be no longer a concern for consumers as it was in the first generation of xEVs.



Technological advancements are taking place in xEVs design. Longer range, high voltage design and higher charging capabilities will become a common place in the year to come requiring an adequate charging infrastructure deployment.



More than 80M of charging stations are expected globally, with domestic installation still playing a pivotal role for the next decade. Almost 15M stations will be located in public and semi-public domains and about 3M will offer a quicker charging experience to final users but challenges will remain on the implementation side!

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S&P Global Mobility E-Motor deep-dive


Tuesday

Wednesday

10:00 - 10:30

 [Add to calendar](#)

The Electric Motor Value Chain and Technologies to Drive Performance

 Wednesday, May 15  E- Mobility Stage

As the automotive industry continues on its path to a zero emission world, the electric motor supply chain is crucial. Alongside evolving supply chain dynamics, critical performance parameters such as power density and efficiency are essential to the wider electric vehicle system, particularly as the price of batteries is not falling as quickly as anticipated.

In this session we will explore the role of OEMs and suppliers in the market and emerging technologies they are using to achieve these performance gains.

- In-depth understanding of the entire eDrive unit value chain
- The impact of motor performance on the electric vehicle
- Technologies emerging to deliver performance
- Impact of material supply on the future of the electric motor

● Electric Motor Value Chain

Speaker



Michael Southcott

Manager of
Propulsion
Component
Research.

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✔ electrification technology ✔ charging infrastructure ✔ e-motors

SPEAKERS



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S&P Global Mobility



Michael Southcott

Associate Manager, Automotive
Supply Chain & Technology,
S&P Global Mobility



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Motor
Components
&
Accessories

