



Automotive Wire Harness Market Assessment 2022

Public Report

July 2022

Study Introduction

The Martec Group is a global market research firm headquartered in Detroit, Michigan. For more than 35 years, we have been providing unparalleled market research to top companies around the globe.

Study Objectives

The study has four primary objectives:

1. Forecast global automotive production and quantify copper demand in wire harnesses for those vehicles
2. Characterize key automotive trends, drivers, barriers, threats, and opportunities impacting the growth of copper in these applications
3. Understand the position of vehicle OEMs and key suppliers with regard to copper usage
4. Summarize the regional difference in trends and adoption for new technologies (zone architecture, ADAS, etc.) and alternative propulsion systems (HEV, BEV, etc.)

Interview Summary: >50 Interviews conducted

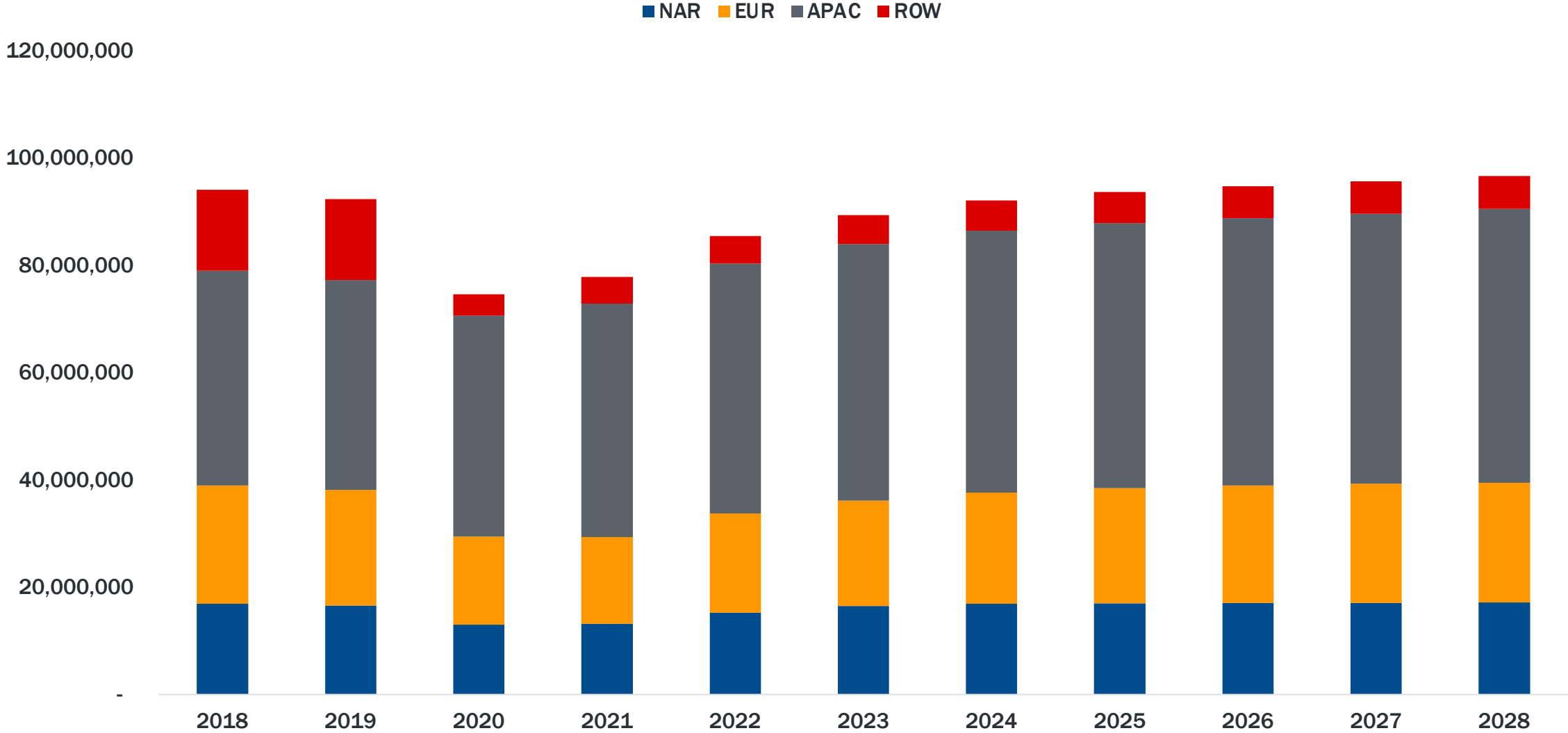


“Copper is still the first choice and is not going anywhere any time soon.”



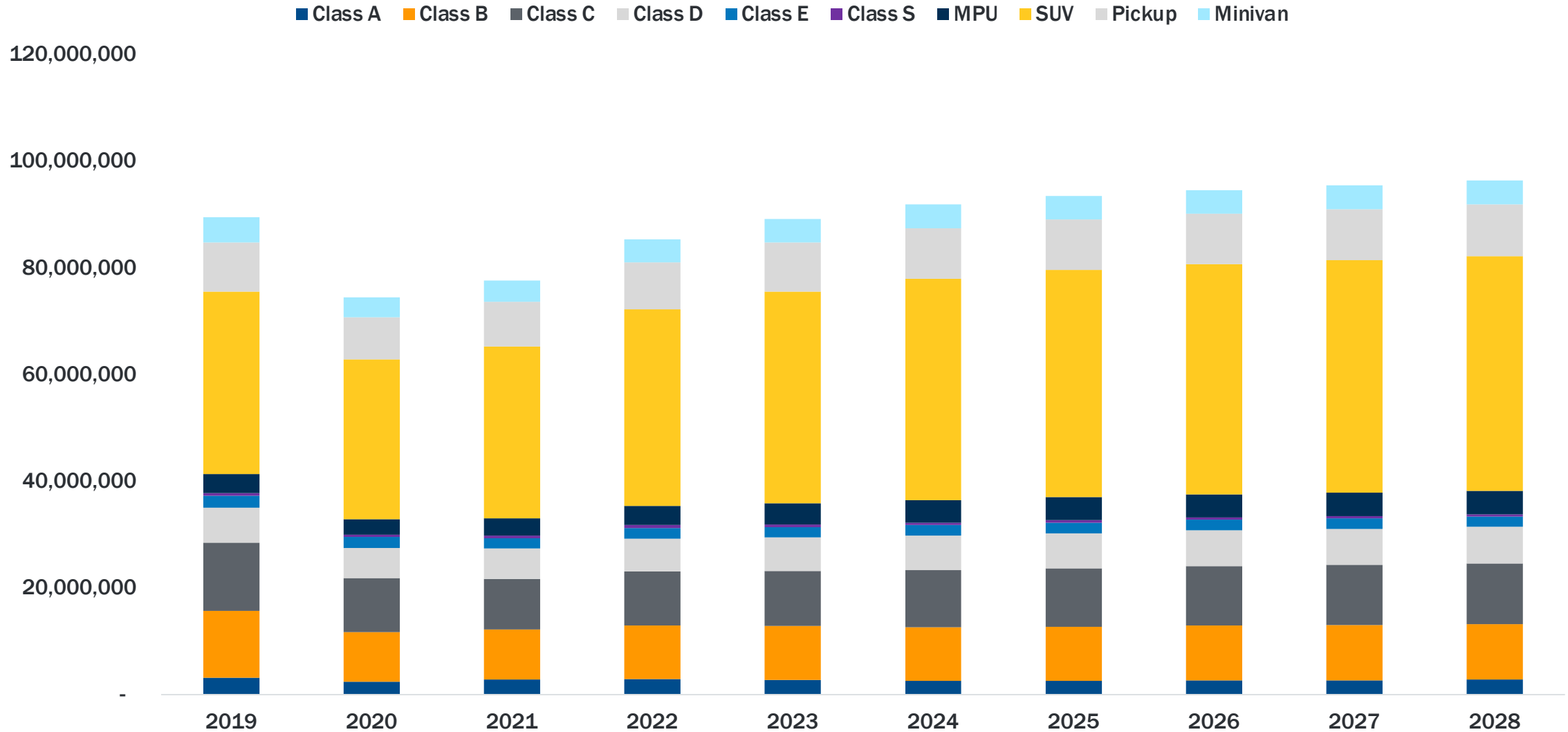
Vehicle Production Forecast by Region

APAC is expected to lose share over the next 8 years, EUR will gain, and NAR/ROW will remain stable.



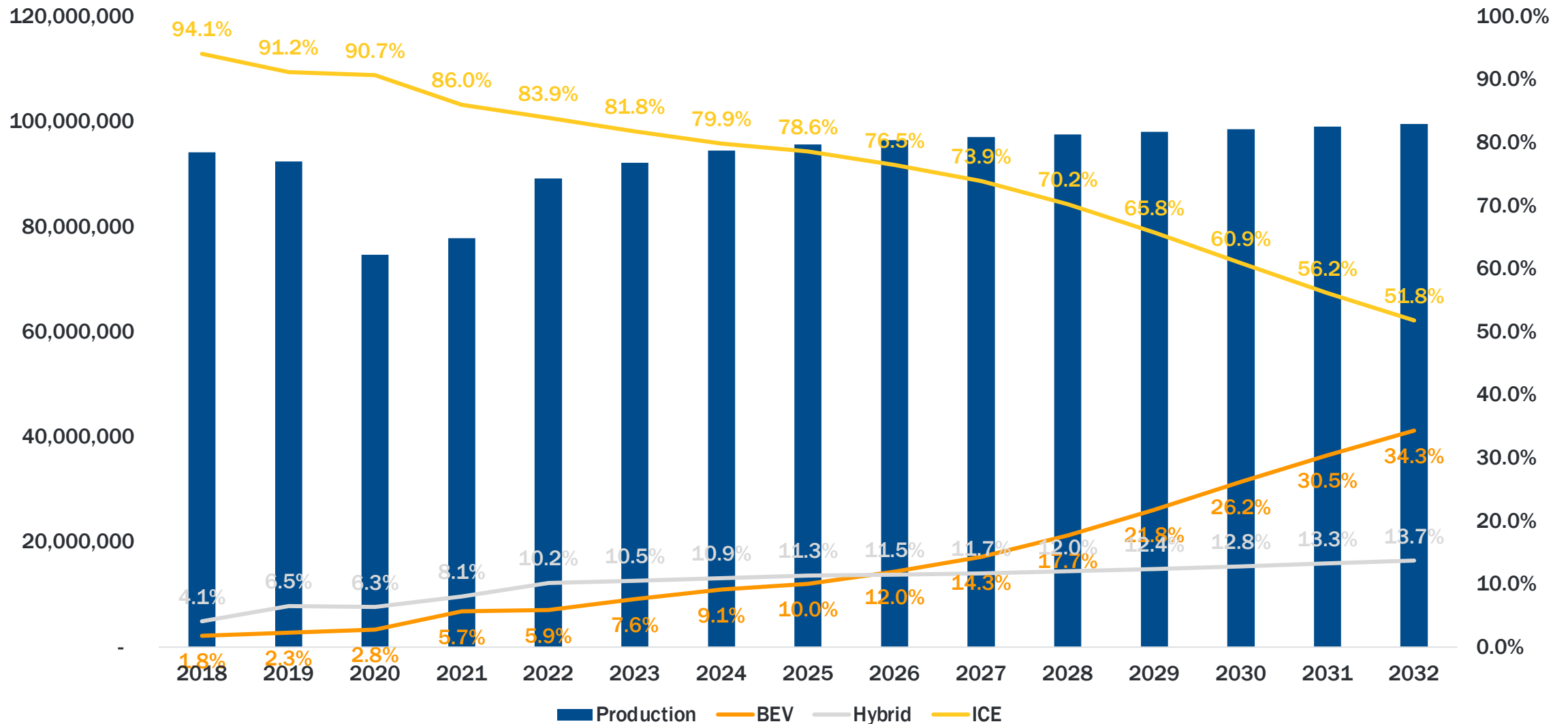
Vehicle Production Forecast by Segment

SUVs will continue to steal share over the next 10 years.



Penetration of New Technologies

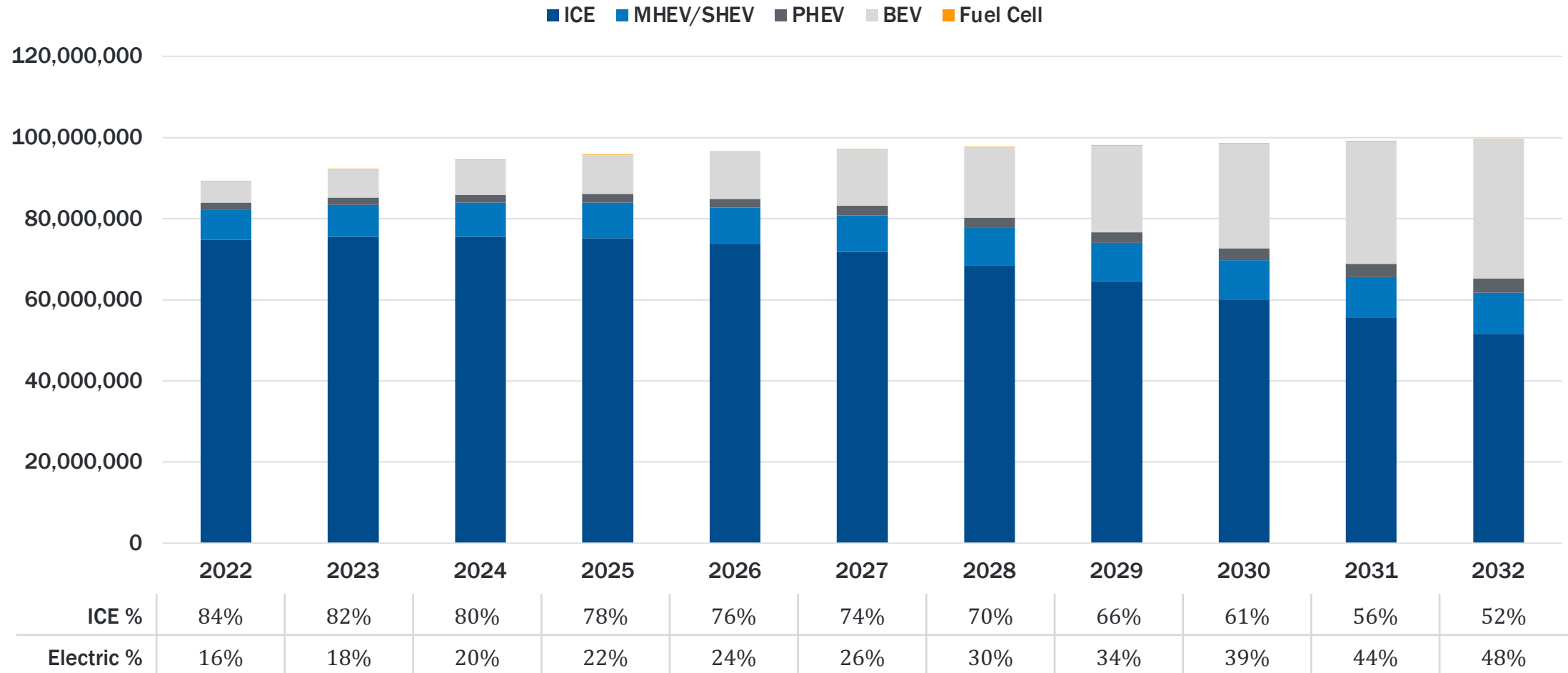
As ICE vehicles decline in share, BEV will grow from ~6% penetration in 2020 to ~34% in 2032.



Vehicle Production by New Technology

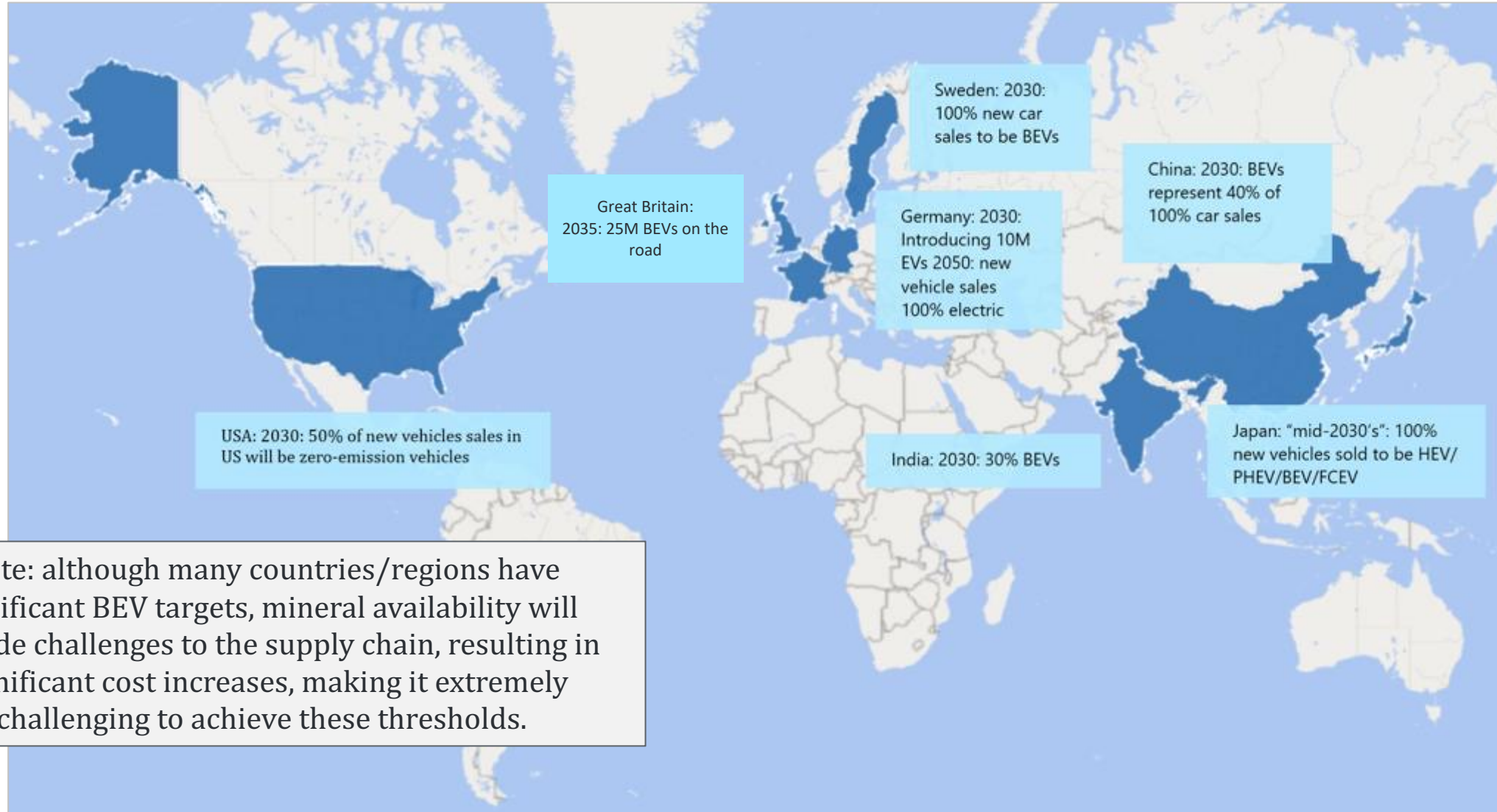
Current vehicle production forecasts estimate about half of vehicles produced to be electric by 2032.

Automotive Production Forecast by Technology Type 2022(F) – 2032(F)



Countries with BEV Mandates/Goals

Martec has analyzed and summarized the BEV mandates for the following key countries & regions



Note: although many countries/regions have significant BEV targets, mineral availability will provide challenges to the supply chain, resulting in significant cost increases, making it extremely challenging to achieve these thresholds.

ADAS

How will autonomous driving features impact automotive copper wire harnesses?

Feedback to date indicates that autonomous features will add copper content to vehicles.

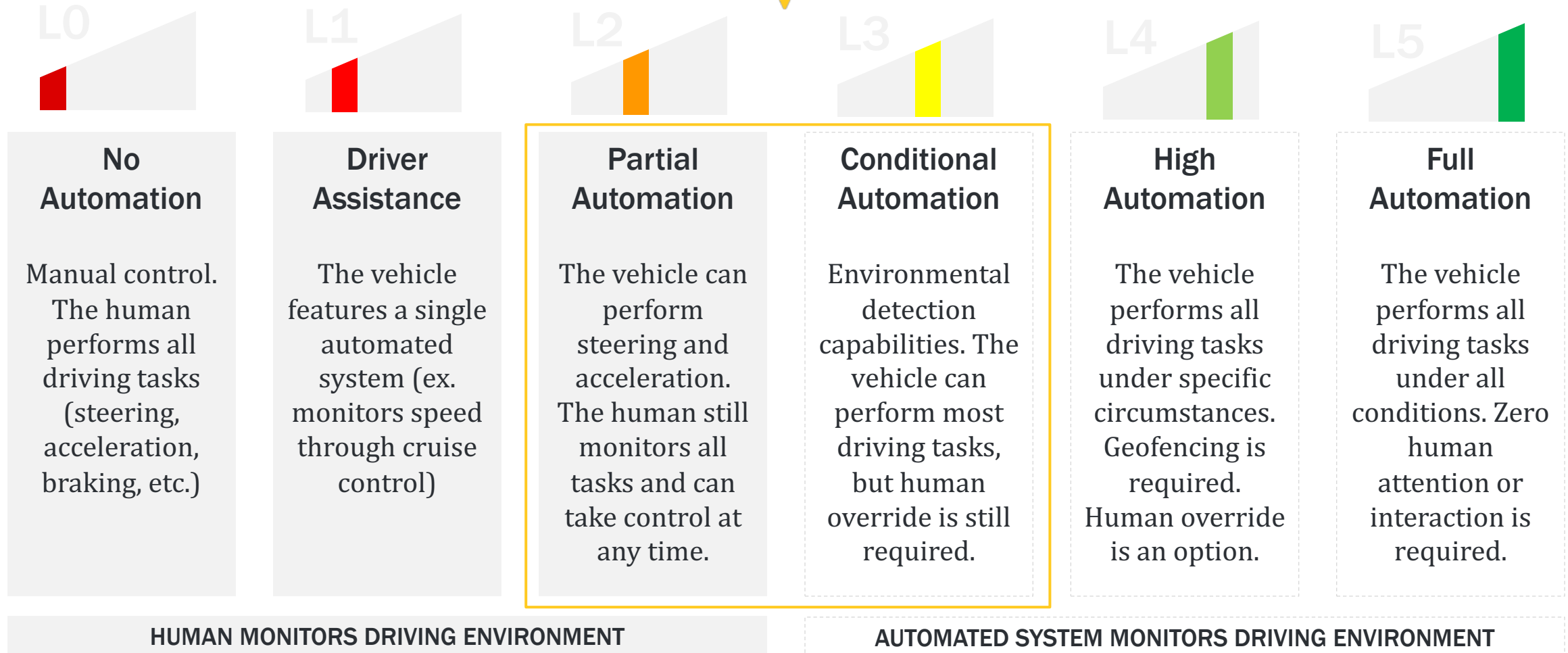
- Features include vision systems (cameras, short-range & long-range radar, lidar) and sensors that require high speed data lines
 - Almost all will remain copper (or copper alloys) due to its size and reliability
 - Typical gauge sizes are 0.13mm² or 0.08mm² copper or copper alloys
- Lidar/radar systems require extremely small wire sizes (0.13mm² is almost too delicate, so OEMs are trying to keep it to 0.35mm²)
- Approximately 1-2kg is an appropriate estimate for an L3 autonomous vehicle
- Aluminum is not an ideal solution for this application and is not being tested at this time, primarily due to its weaker conductivity than copper

“ADAS features would undoubtedly need more control modules and additional equipment... they would drive up the number of wires being used in the low voltage and communication systems.”

- Rivian

Levels of Autonomous Driving

In 2022, most vehicles being produced are in the “L2+” or L3 levels.



Autonomous Levels Roadmap

Today in 2022, L3 is becoming mainstream while luxury L4 vehicles are just starting to hit the roads.

2010

2015

2020

2025

2030

2035

2010 – 2020

ADAS Features Available; primarily L0-L2 vehicles available

~2021 – 2025: L3 Rollout

Led by Luxury (Tesla, Mercedes, Audi); followed by Mainstream (GM, Volvo)

~2027 – 2033: L4 Rollout

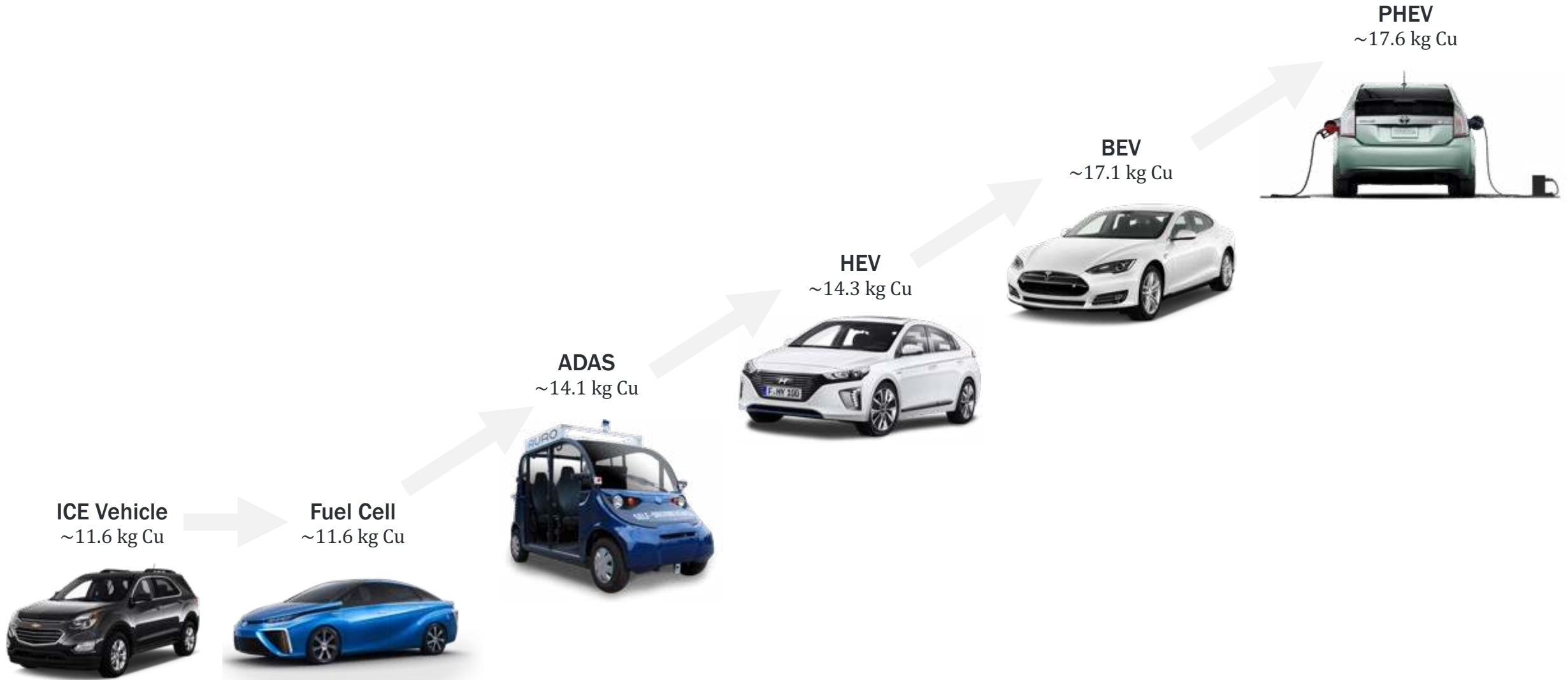
Led by Luxury (Tesla, BMW); followed by Mainstream (Ford, VW, Nissan)

2035+: L5 Rollout

Likely to be led by Luxury and followed by Mainstream

New Technologies' Increase in Copper (Class C vehicle)

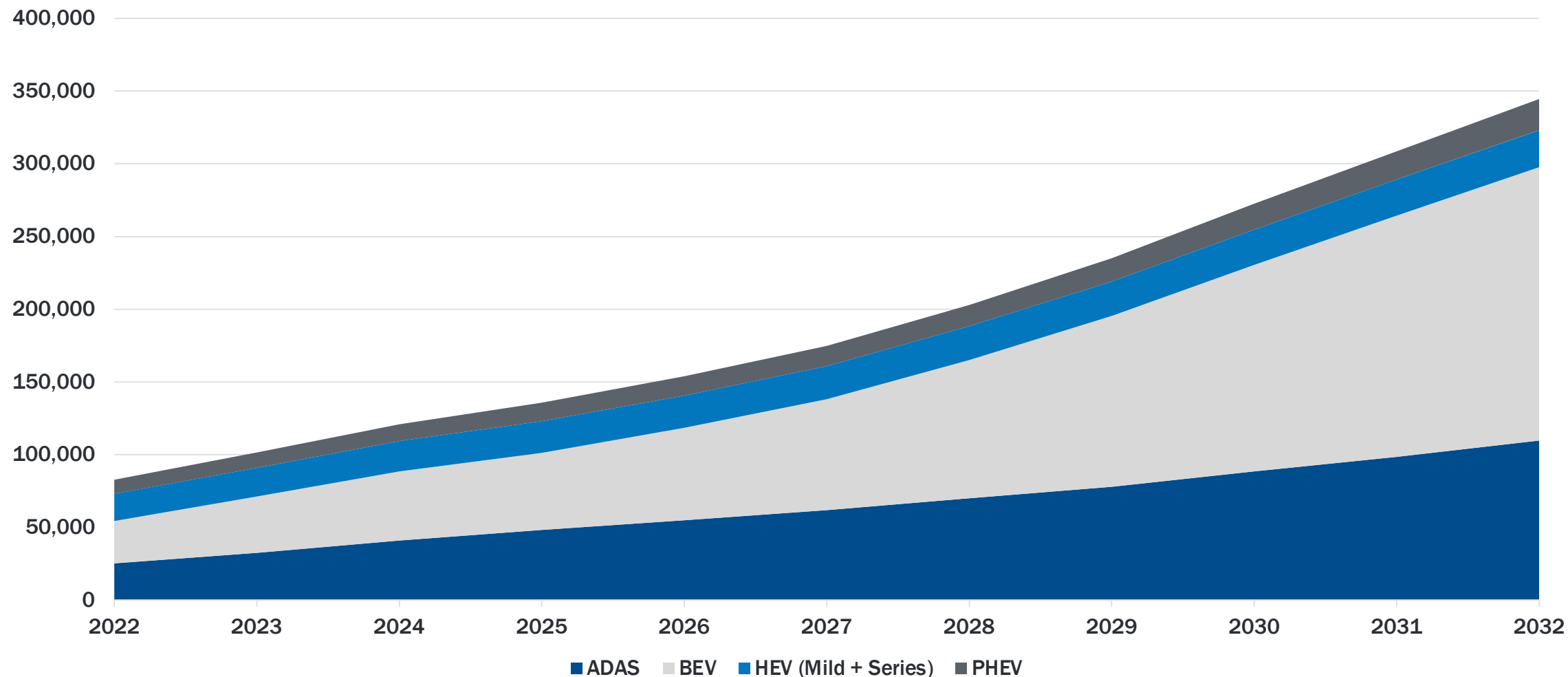
Alternative propulsion systems will require more copper wiring per vehicle than an ICE vehicle.



Copper Content Added by New Technologies

Martec estimates that new technologies will require an additional 344k metric tonnes by 2032.

Copper Added Due to New Technologies (Metric Tonnes), 2022 – 2032(F)

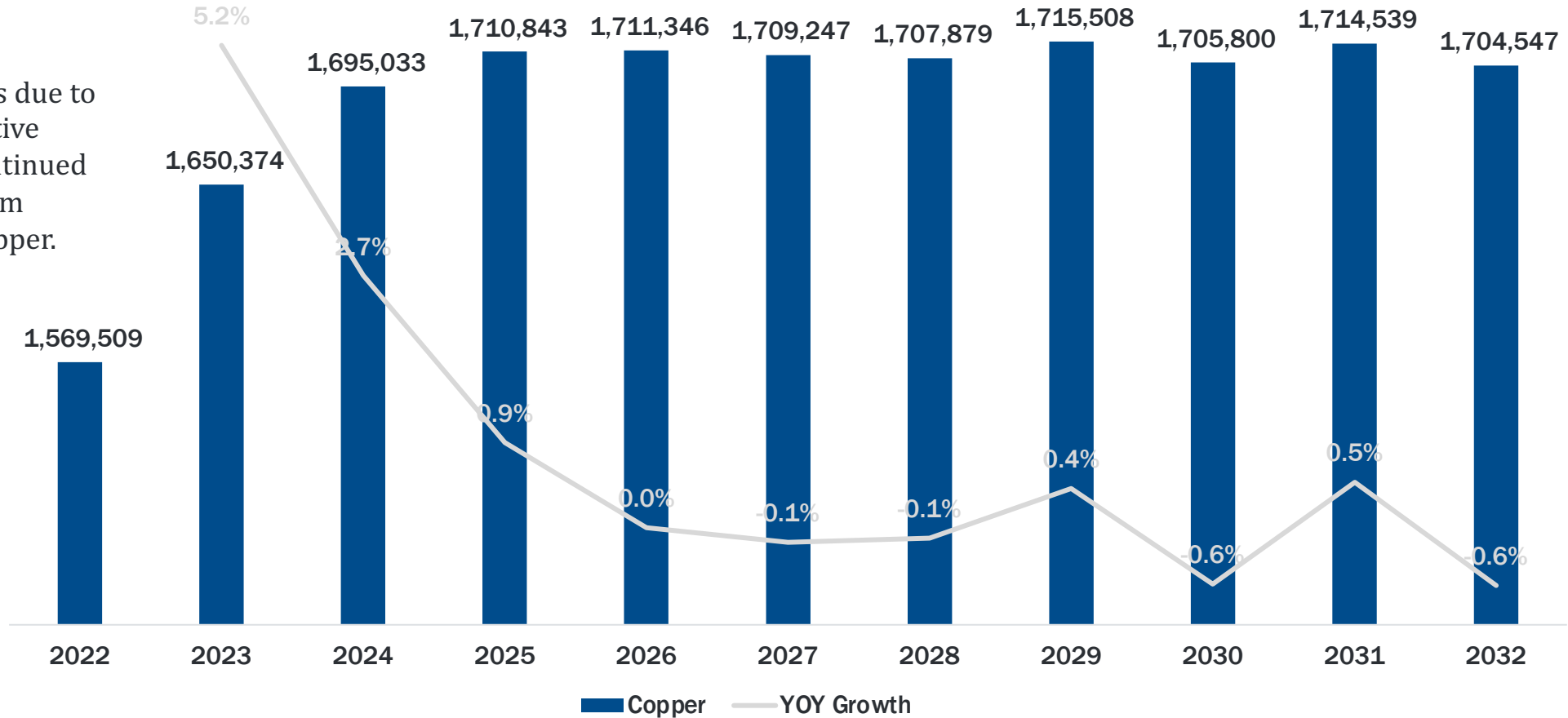


Total Copper Demand

Copper usage in automotive wire harnesses will remain at ~1.7M tonnes from 2025 – 2032.

Total Copper Demand due to Automotive Wire Harnesses (in metric tonnes)

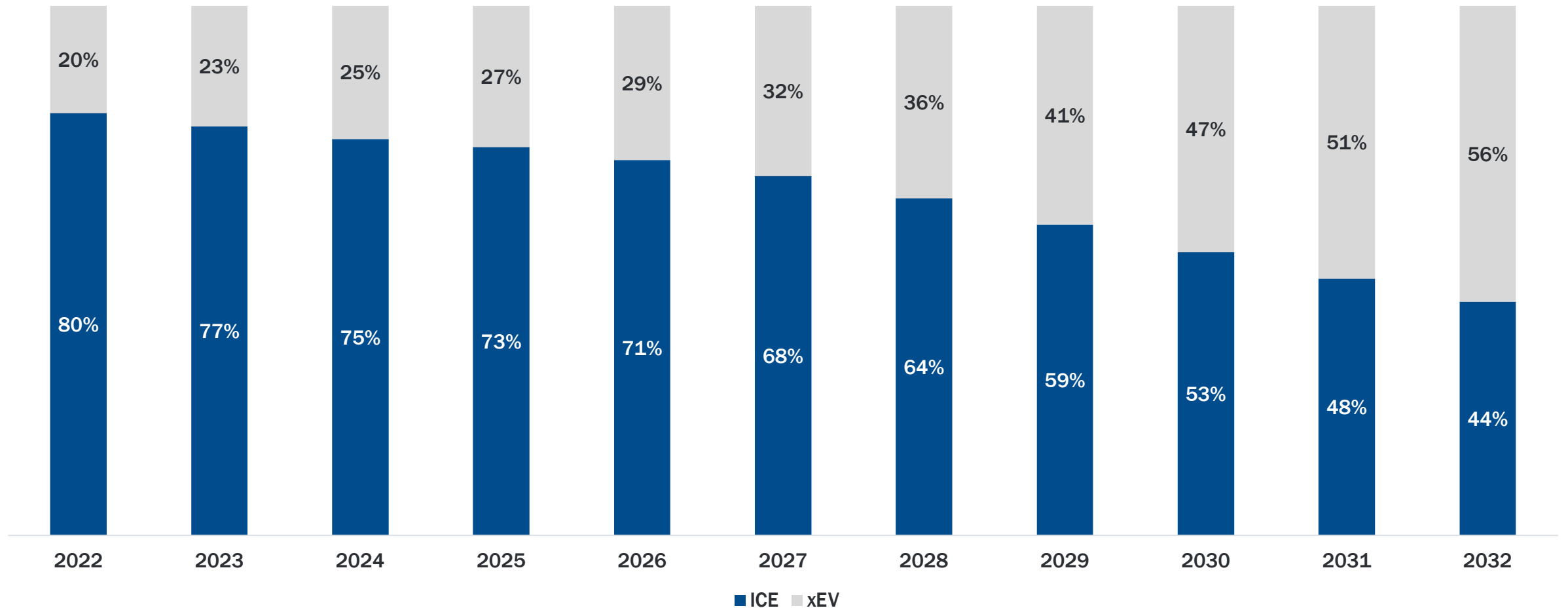
YOY growth flattens due to stagnating automotive production and continued (but slow) aluminum displacement of copper.



Copper Demand by Propulsion Type

Electric vehicles (including HEVs) will grow from 20% of copper demand for wire harnesses in 2022 to 56% in 2032.

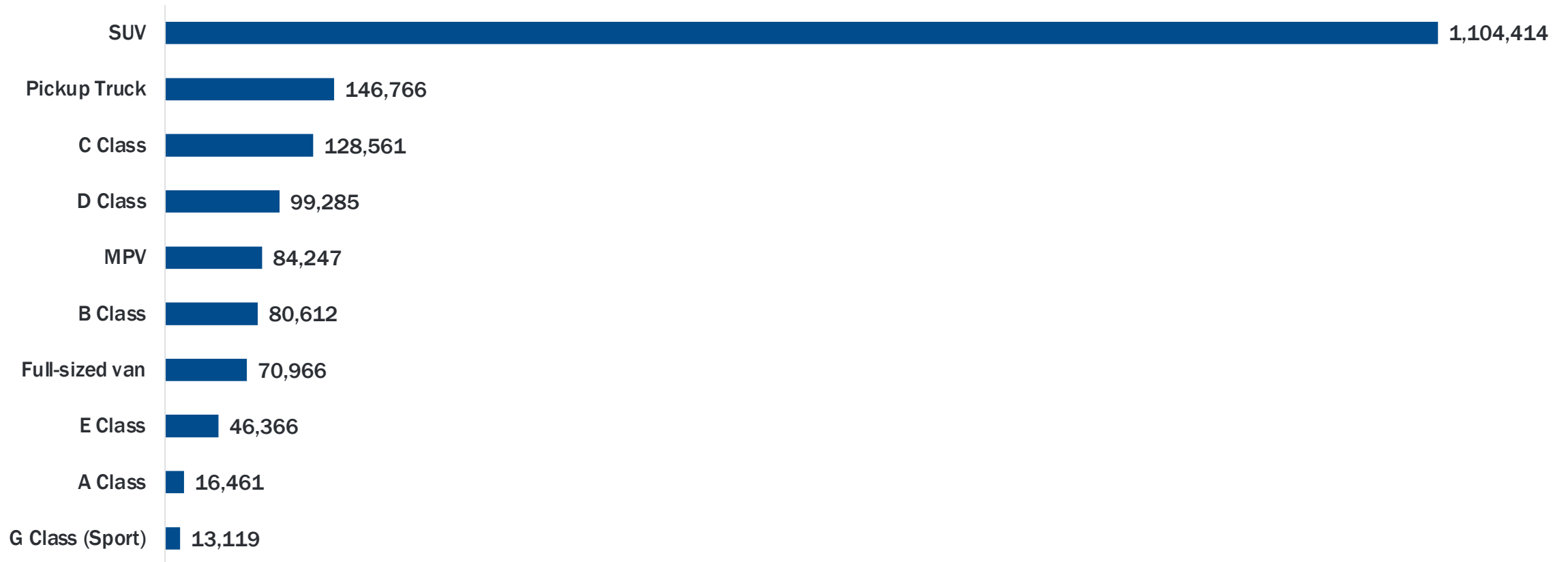
Total Global Automotive Wire Harness Copper Demand Split by Propulsion Type: xEV vs. ICE



Copper By Vehicle Segment

SUVs hold the highest potential for copper demand based on Cu weight per unit and production forecast volumes.

Total Global Automotive Wire Harness Copper Demand By Vehicle Segment, Metric Tonnes
Average of 2022 – 2032



Executive Summary

1. Martec expects copper demand to grow with the further implementation and development of new technologies.
 - a. BEV, HEV, PHEV, and ADAS will all contribute to growth in copper demand over the next 10+ years
 - b. Martec estimates that annual copper usage will hover at ~1.7M tonnes between 2025 and 2032, due to stagnating production forecast numbers
 - c. SUVs will drive the most demand for copper, averaging 1.1M tonnes per year between 2022 and 2032

2. Martec expects copper to continue to be the material of choice over aluminum.
 - a. Trends in favor of fuel economy regulation, weight reduction, and miniaturization are nothing new and are still driving demand for copper (versus aluminum)
 - b. Some OEMs and suppliers are testing and starting to implement aluminum, but experts maintain that aluminum penetration will remain low
 - c. Aluminum bus bars are a threat to copper wire harnesses within the battery pack, but still have plenty of downfalls compared to the reliability of copper